

William Fisher *1691*
His Book
1691
Little
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SYLVARUM:

OR, *LE. 24. 34*

A Natural History,
IN
TEN CENTURIES

Whereunto is newly added the History Na-
turall and Experimentall of LIFE and
DEATH, or of the Prolon-
gation of LIFE.

Both Written by the right honourable FRANCIS
Lord VERULAM Viscount St. ALBAN.

Published after the Authors death,
By WILLIAM RAWLEY Doctor in Divini-
ty, one of his Majesties Chaplaines.

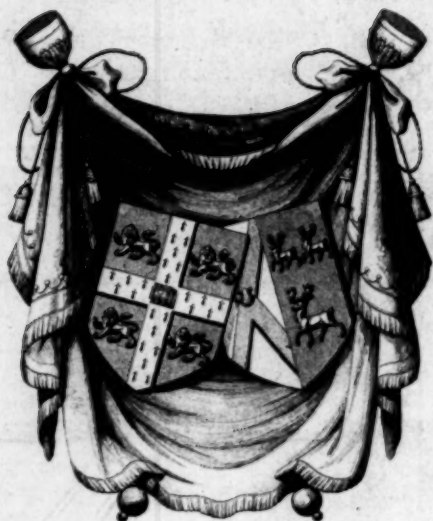
Hereunto is newly added an Alphibetical Table of the Prin-
cipal things contained in the ten Centuries.

The Eighth Edition, Whereunto is added Articles of En-
quiry touching Metals and Minerals.

Written by the right honourable FRANCIS BACON
Baron of VERULAM viscount St. ALBAN.

LONDON,

Printed by J. F. and S. G. for William Lee, and are to be sold
by Thomas Williams at the Bible in Little-
Brittain, 1664.



Academiae Cantabrigiae
Liber.

LONDON

Printed by J. E. and J. D. for William Storer and are to be sold
by Chapman and Hall at the British Museum.



TO THE MOST HIGH
AND MIGHTY PRINCE
CHARLES,

BY THE GRACE OF GOD,
King of *Great Britaine, France, and*
Ireland, Defender of the Faith, &c.

May it please your Most Excellent Majesty ;



He whole Body of the *Natural History*, either designed or written, by the late *Lord Viscount S. Alban*, was dedicated to your *Majesty*, in his Book *De Ventis*, about four years past; when your *Majesty* was *Prince* : So as there needed no new Dedication of this *Worke*, but only in all humbleness, to let your *Majesty* know, it is yours. It is true; if that *Lord* had lived, your *Majesty*, ere long, had been invoked, to the Protection of another *History*, whereof, not *Natures Kingdom*, as in this; but these of

The Epistle Dedicatory.

your *Majesties*, (during the Time and *Reign* of *King Henry the Eighth*) had been the Subject; Which since it died under the Designation meerely; there is nothing left, but your *Majesties* Princely Goodness, graciously to accept of the Undertakers Heart, and Intentions; Who was willing to have parted, for a while, with his Darling *Philosophy*, that he might have attended your Royall Commandement, in that other *Worke*. Thus much I have been bold, in all lowliness to represent unto your *Majesty*, as one that was trusted with his *Lordships Writings*, even to the last. And as this *Worke* affecteth the *Stampe* of your *Majesties Royall Protection*, to make it more currant to the *World*; so under the *Protection* of this *Worke*, I presume in all humbleness to approach your *Majesties* presence; And to offer it up into Your *Sacred Hands*.

Your MAJESTIES most Loyall

and Devoted Subject,

W. RAVVLEY.



TO THE
READER.

HAving had the Honour to be continually with my Lord, in compiling of this *Work*; And to be employed therein; I have thought it not amiss, (with his Lordships good leave and liking,) for the better satisfaction of those that shall read it, to make known somewhat of his Lordships Intentions, touching the Ordering, and Publishing of the same. I have heard his Lordship often say, that if he should have served the glory of his own Name, he had been better not to have published this *Naturall History*: For it may seem an indigested Heap of Particulars; and cannot have that Lustre, which Books cast into Methods have: But that he resolved to preferre the good of Men, and that which might best secure it, before any thing, that might have Relation to Himself. And, he knew well, that there was no other way open to unloose Mens minds, being bound; and (as it were) Maleficate, by the Charms of deceiving Notions, and Theories; and thereby made Impotent for Generation of Works; But onely no where to depart from the Sense, and clear Experience; But to keep close to it, especially in the beginning: Besides, this *Naturall History* was a Debt of his, being designed and set down, for a third part of the *Instaurati- on*. I have also heard his Lordship discourse, that Men (no doubt) will think many of the *Experiments* contained in this Collection, to be Vulgar and Triviall: Mean and Sordid; Curious and Fruitless: And therefore he wisheth, that they would have perpetually before their eyes, what is now in doing: And the difference between this *Natural History*, and others. For those *Natural Histories*, which are Extant, being gathered for Delight

delight and use, are full of pleasant Descriptions and Pictures; and affect and seek after Admiration, Rarities, and Secrets. But contrariwise, the Scope, which his Lordship intendeth, is to write such a *Naturall History*, as may be Fundamentall to the Erecting and Bulding of a true *Philosophy*: For the Illumination of the *Understanding*; the Extracting of *Axiomes*, and the producing of many Noble *Works*, and *Effects*. For he hopeth by this means, to acquit himself of that, for which he taketh *Himself* in a sort bound; And that is, the Advancement of Learning and Sciences. For having, in this present Work, Collected the Materialls for the Building; and in his *Novum Organum* (of which his Lordship is yet to publish a second part) set down the Instruments and Directions for the Work; Men shall now be wanting to themselves if they raise not knowledge to that perfection, whereof the Nature of Mortal men is capable. And in this behalf, I have heard, his Lordship speak complainingly; that his Lordship (who thinketh, that he deserveth to be an Architect in this bulding) should be forced to be a Work-man, and a Labourer; and to dig the Clay, and burn the Brick; And more then that, (according to the hard Condition of the *Israelites* at the latter end) to gather the Straw and Stubble, over all the Fields, to burn the Bricks withall. For he knoweth, that except he do it nothing will be done: Men are so set to despise the meanes of their owne good. And as for the *Baseness* of many of the Experiments; as long as they be Gods Works, they are honourable enough. And for the *Vulgarnesse* of them; true *Axiomes* must be drawn from plain Experience, and not from doubtfull; and his Lordships course is to make Wonders Plain, and not Plain things Wonders; and that Experience likewise must be broken and grinded, and not whole, or as it groweth; and for Use, his Lordship hath often in his Mouth, the two kinds of *Experiments*; *Experimenta Frustrifera*, and *Experimenta Lucifera*: *Experiments of Use*, and *Experiments of Light*. And he reporteth himself, whether he were not a strange Man, that should think, that Light hath no Use, because it hath no Matter. Further his Lordship thought good also, to adde unto many of the *Experiments* themselves, some *Gloss* of the *Causes*, that in the succeeding Work of *Interpreting Nature*, and *Frassing Axiomes*, all things may be in more readines. And for the *Causes* herein by him assigned, his Lordship perswadeth himself, they are farre more certain, than those

To the Reader.

those that are rendred by Others; not for any Excellency of his own Wit, (as his Lordship is wont to say) but in respect of his continuall Conversation with *Nature*, and *Experience*. He did consider likewise, that by this Addition of *Causes*, mens minds (which make so much haste to find out the *Causes* of things;) would not think themselves utterly lost in a vast Wood of *Experience*, but stay upon these *Causes*, (such as they are) a little, till true *Axiomes* may be more fully discovered. I have heard his Lordship say also, that one great reason, why he would not put these Particulars into any exact *Method*, (though he, that looketh attentively into them, shall find, that they have a secret Order) was because, he conceived, that other men would now think that they could do the like: And so go on with a further Collection: which if the *Method* had been Exact, many would have despaired to attain by Imitation. As for his Lordships love of Order, I can referre any Man to his Lordships Latine Book, *De Augmentis Scientiarum*: which, if my Judgment be any thing, is written in the Exactest Order, that I know any Writing to be. I will conclude, with an usuall speech of his Lordships. That this Work of his *Naturall History*, is the *World*, as GOD made it, and not as men have made it; For that it hath nothing, if Imagination.

This Epistle is the same, that should have been prefixed to this Book, if his Lordship had lived.

W. Rawley.

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Pembles Works.
Orsins Catechisme.
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Argument of Habitus Corpus.

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L. Bacon of Ordinances.

Argument of Ship money.

Cockys Compleat Coppholder.

Baile and main price.

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The Innocent Lady, Translated into English, by *Sir W. Lower*.

NATURAL



NATURAL HISTORY.

I. Century

Digge a Pit upon the *Sea-shore*, somewhat above the High-water Mark, and sink it as deep as the Low-water Mark; And as the *Tide* cometh in, it will fill with *Water*, Fresh and Potable. This is commonly practised upon the Coast of *Barbary*, where other fresh *Water* is wanting. And *Cæsar* knew this well, when he was besieged in *Alexandria*: *For by digging of Pits in the *Sea-shore*, he did frustrate the Laborious Works of the Enemies, which had turned the *Sea-water* upon the Wells of *Alexandria*; and so saved his Army, being then in Desperation. But *Cæsar* mistook the Cause; For he thought that all *Sea-sands* had Natural Springs of *Fresh-water*. But it is plain, that it is the *Sea-water*; because the Pit filleth according to the Measure of the *Tide*: And the *Sea-water* passing or straining through the Sands, leaveth the Saltness.

I remember to have read, that Tryal hath been made of *Salt-water* passed through *Earth*; though ten Vessels one within another, and yet it hath not lost his Saltness, as to become potable: But the same Man saith, that (by the Relation of another) *Salt-water* drayned through twenty Vessels, hath become Fresh. This Experiment seemeth to cross that other of Pits, made by the *Sea-side*; and yet but in part, if it be true, that twenty Repetitions do the effect. But it is worth the Note, how poor the Imitations of Nature are, in common course of Experiments, except they be led by great Judgement, and some good Light of Axiomes. For first, there is no small difference between a Passage of *Water* through twenty small Vessels; and through such a distance, as between the Low-water and High-water Mark. Secondly, there is a great difference between Earth and Sand. For all Earth hath in it a kind of Nitrous Salt, from which Sand is more free: And besides, Earth doth not strain the *Water* so finely, as Sand doth. But there is a third Point, that I suspect as much, or more than the other two; And that is, that in the experiment of Transmission of the *Sea-Water* into the Pits, the *Water* riseth; but in the experiment of transmission of the *Water*, through the Vessels, it falleth: Now certain it is, that the Salter part of *Water* (once

Experiments
in consort, touch-
ing the
Straining and
Passing of Bod-
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call Percolati-
on.

I

3

the principal
difference be-
tween the
two is, that in
the one it is
the Salter part
of the Water
which is
the principal
part of the
Experiment.

salted throughout) goeth to the bottome. And therefore no marvel if the drayning of *water* by delcent, doth make it fresh: Besides, I do somewhat doubt, that the very dashing of the *water*, that cometh from the Sea, is more proper to strike off the salt part, than where the *water* slideth of her own motion.

3 It seemeth *Percolation* or *Transmission* (which is commonly called *straining*) is a good kind of *Separation*; not onely of thick from thin, and gross from fine, but of more subtile Natures; and varieth according to the Body through which the *Transmission* is made. As if through a woollen Bag, the Liquor leaveth the Fatness; if through Sand, the Saltness, &c. They speak of severing Wine from Water; passing it through Ivie wood, or through other the like porous Body; but *Non constat*.

4 The *Gum* of *Trees* (which we see to be commonly shining and clear) is but a fine Passage, or *straining* of the Juice of the Tree, through the Wood and Bark. And in like manner, *Cornish Diamonds*, and *Rock Rubies*, (which are yet more resplendent than *Gums*) are the fine Exudations of *Stone*.

5 *Aristotle* giveth the Cause, vainly, why the *Feathers* of *Birds* are of more lively Colours, than the *Hairs* of *Beasts*; for no *Beast* hath any fine Azure, or Carnation, or Green *Hair*. He saith, it is, because *Birds* are more in the Beams of the Sun, than *Beasts*; but that is manifestly untrue; For *Cattle* are more in the Sun than *Birds*, that live commonly in the Woods, or in some Covert. The true Cause is, that the excrementitious Moisture of living Creatures, which maketh as well the *Feathers* in *Birds*, as the *Hair* in *Beasts*, passeth in *Birds* through a finer and more delicate Strainer, than it doth in *Beasts*: For *Feathers* pass through Quills, and *Hair* through Skin.

6 The *Clarifying* of *Liquors* by Adhesion, is an Inward *Percolation*; and is effected, when some cleaving Body is mixed, and agitated with the *Liquors*; whereby the grosser part of the *Liquor* sticks to that cleaving Body; and so the finer parts are freed from the grosser. So the *Apothecaries* clarify their *Syrups* by whites of Eggs, beaten with the Juices which they would clarify; which whites of Eggs gather all the dregs and grosser parts of the Juice to them; and after the *Syrup* being set on the fire, the whites of Eggs themselves harden, and are taken forth. So *Ippocras* is clarified by mixing with Milk, and stirring it about, and then passing it through a Woollen Bagg, which they call *Hippocrates Sleeve*; and the cleaving Nature of the Milk draweth the Powder of the Spices, and grosser parts of the *Liquor* to it; and in the passage they stick upon the Woollen bagg.

7 The *Clarifying* of *Water*, is an *Experiment* tending to Health; besides the pleasure of the Eye, when *Water* is Crystalline. It is effected by casting in, and placing Pebbles, at the Head of a Current; that the *water* may strain through them.

8 It may be, *Percolation* doth not onely cause Clearness and Splendour, but sweetness of savour; for that also followeth, as well as Clearness, when the finer parts are severed from the grosser. So it is found, that the sweats of men that have much heat, and exercise much, and have clean Bodies and fine Skins, do smell sweet; as was said of *Alexander*; and we see, commonly, that *Gums* have sweet Odours.

Experiments
in Consonance
touching Motion
of Bodies upon
their Pressure.

Take a *Glass*, and put *Water* into it, and wet your finger, and draw it round about the lip of the *Glass*, pressing it somewhat hard; and after you have drawn it some few times about, it will make the *Water* frisk and

and sprinkle up, in a fine Dew. This *Instance* doth excellently demonstrate the Force of *Compression* in a solid Body. For whensoever a solid Body (as Wood, Stone, Metal, &c.) is pressed, there is an inward Tumult in the parts thereof; seeking to deliver themselves from the Compression: And this is the Cause of all *Violent Motion*. Wherein it is strange in the highest Degree, that this *Motion* hath never been observed, nor enquired; It being of all *Motions*, the most Common, and the Chief Root of all *Mechanical Operations*. This *Motion* worketh in round at first, by way of Proof, and Search, which way to deliver it self; and then worketh in Progress, where it findeth the Deliverance easiest. In *Liquors* this *Motion* is visible: For all *Liquors* stricken make round Circles, and withall dash; but in *Solids* (which break not) it is so subtle, as it is invisible: but nevertheless bewrayeth it self by many effects; as in this *Instance* whereof we speak. For the *Pressure* of the Finger furthered by the wetting (because it sticketh so much the better unto the Lip of the *Glass*) after some continuance, putteth all the small parts of the *Glass* into work; that they strike the *Water* sharply; from which *Percussion* that sprinkling cometh.

If you strike or pierce a *Solid Body*, that is brittle, as *Glass*, or *Sugar*, it breaketh not only, where the immediate force is; but breaketh all about into shivers and fitters; The *Motion*, upon the *Pressure*, searching all waies, and breaking where it findeth the *Body* weakest.

The *Powder* in *Shot* being dilated into such a *Flame*, as endureth not *Compression*, moveth likewise in round (the *Flame* being in the Nature of a liquid *Body*) sometimes recoyling, sometimes breaking the *Pieces*; but generally discharging the *Bullet*, because there it findeth easiest Deliverance.

This *Motion* upon *Pressure*, and the Reciprocal thereof, which is *Motion* upon *Tensure*; we use to call (by one common Name) *motion of Liberty*; which is, when any *Body*, being forced to a *Preter-Natural* Extent, or Dimension, delivereth and restoreth it self to the Natural: As when a blown *Bladder* (pressed) riseth again; or when *Leather* or *Cloth* tentured, spring back. These two *motions* (of which there be infinite *Instances*) we shall handle in due place.

This *motion* upon *Pressure* is excellently also demonstrated in *Sounds*; As when one chimeth upon a *Bell*, it soundeth; but as soon as he layeth his hand upon it, the *Sound* ceaseth: And so, the sound of a *Virginal String*, as soon as the Quill of the Jack falleth from it, stoppeth. For these *sounds* are produced by the subtle percussio[n] of the Minute parts of the *Bell*, or *String*, upon the *Air*; All one, as the *Water* is caused to leap by the subtle percussio[n] of the Minute parts of the *Glass*, upon the *Water*, whereof we spake a little before in the ninth *Experiment*. For you must not take it to be, the local shaking of the *Bell*, or *String* that doth it. As we shall fully declare, when we come hereafter to handle *sounds*.

TAKE a *Glass* with a *Belly*, and a long *Neb*; fill the *Belly* (in part) with *Water*: Take also another *Glass*, whereinto put *Claret Wine* and *Water* mingled; Reverse the first *Glass*, with the *Belly* upwards, stopping the *Neb* with your finger; then dip the mouth of it within the second *Glass*, and remove your finger: Continue it in that posture for a time; and it will unminge the *Wine* from the *Water*: The *Wine* ascending and settling in the top of the upper *Glass*; and the *Water* descending and settling in the bottome of the lower *Glass*. The passage is apparent to the Eye; for

Experiments
in Confort
touching Se-
parations of
Bodies by
Weight.

14.

you shall see the *Wine*, as it were, in a small vein, rising through the *Water*. For handfomness sake (because the Working requireth some small time) it were good you hang the upper *Glass* upon a Nail. But as soon as there is gathered so much pure and unmixed *Water* in the bottome of the Lower *Glass*, as that the Mouth of the Upper *Glass* dippeth into it, the *Motion* ceaseth.

15. Let the Upper *Glass* be *Wine*, and the Lower *Water*; there followeth no *Motion* at all. Let the Upper *Glass* be *Water* pure, the Lower *Water* coloured; or contrariwise; there followeth no *Motion* at all. But it hath been tryed, that though the mixture of *Wine* and *Water*, in the Lower *Glass*, be three parts *Water*, and but one *Wine*; yet it doth not dead the *Motion*. This *Separation* of *Water* and *Wine* appeareth to be made by *Weight*; for it must be of *Bodies* of unequal weight, or else it worketh not; and the heavier *Body* must ever be in the upper *Glass*. But then note withall, that the *water* being made pensible, and there being a great weight of *Water* in the Belly of the *Glass*, sustained by a small Pillar of *Water* in the neck of the *Glass*; It is that, which setteth the *Motion* on work: For *Water* and *Wine* in one *Glass*, with long standing, will hardly sever.

16. This Experiment would be extended from Mixtures of several *Liquors*, to *Simple Bodies*, which consist of several Similiar Parts: Try it therefore with *Broyn* or *Salt-water*, and *Fresh-water*: Placing the *Salt-water* (which is the heavier) in the upper *Glass*; and see whether the *Fresh* will come above. Try it also with *Water thick Sugred*, and *Pure Water*; and see whether the *Water*, which cometh above, will lose his sweetness: For which purpose it were good there were a little Cock made in the Belly of the upper *Glass*.

Experiments
in Confort
touching Ju-
dicious and
Accurate In-
fusions, both in
Liquors, and
Air.

17. **I**N *Bodies* containing Fine Spirits, which do easily dissipate, when you make *Infusions*; the Rule is, A short stay of the *Body* in the *Liquor* receiveth the Spirit; and a longer stay confoundeth it; because it draweth forth the Earthy Part withall; which embaseth the finer. And therefore it is an Error in *Physitians*, to rest simply upon the length of stay for encreasing the vertue. But if you will have the *Infusion* strong, in those kind of *Bodies*, which have fine Spirits, your way is, not to give longer time, but to repeat the *Infusion* of the *Body* oftner. Take *Violets*, and infuse a good Pugil of them in a Quart of *Vinegar*; let them stay three quarters of an hour, and take them forth; and refresh the *Infusion* with like quantity of new *Violets*, seven times; and it will make a *Vinegar* so fresh of the *Flower*, as if, a Twelve-month after, it be brought you in a Saucer, you shall smell it before it come at you. Note, that it smelleth more perfectly of the *Flower*, a good while after, than at first.

18. This Rule, which we have given, is of singular use, for the Preparations of *Medicines*, and other *Infusions*. As for Example; the Leaf of *Burrage* hath an Excellent Spirit, to repress the fuliginous Vapour of Dusky Melancholy, and so to cure Madnes: But nevertheless, if the Leaf be infused long, it yeildeth forth but a raw substance, of no Vertue: Therefore I suppose, that if in the Must of *Wine*, or Wort of *Beer*, while it worketh, before it be Tunned, the *Burrage* stay a small time, and be often changed with fresh; It will make a sovereign Drink for Melancholy Passions. And the like I conceive of *Orenge-Flowers*.

19. *Rubar* hath manifestly in it Parts of contrary Operations: Parts that purge, and parts that bind the body: and the first lay looser, & the latter lay deeper:

deeper : So that if you infuse *Rubarb* for an hour, and crush it well, it will purge better, and binde the Body less after the purging, than if it stood twenty four hours; This is tryed, but I conceive likewise, that by Repeating the *Infusion* of *Rubarb*, several times (as was said of *Violets*) letting each stay in but a small time; you may make it as strong a *Purging Medicine*, as *Scammony*. And it is not a small thing won in *Physick*, if you can make *Rubarb*, and other *Medicines* that are *Benedict*, as strong *Purgers*, as those that are not without some *Malignity*.

Purging Medicines, for the most part, have their *Purgative Vertue*, in a fine Spirit; As appeareth by that they endure not boyling, without much loss of vertue. And therefore it is of good use in *Physick*, if you can retain the *Purging* of Vertue, and take away the Unpleasant tast of the *Purger*; which it is like you may do, by this Course of *Infusing* oft with little stay. For it is probable, that the Horrible and Odious Tast, is in the Grosser part.

Generally, the working by *Infusions* is gross and blind, except you first try the issuing of the several parts of the Body, which of them Issue more speedily, and which more slowly; And so by apportioning the time, can take and leave that Quality which you desire. This to know, there be two waies; The one to try what long stay, and what short stay worketh, as hath been said : The other to try, in Order, the succeeding *Infusions*, of one and the same Body, successively, in several *Liquors*. As for example; Take *Orange-Pills*, or *Rose-Mary*, or *Cinnamon*, or what you will; And let them Infuse half an hour in *Water*; then take them out, and Infuse them again in other *Water*; and so the third time: And then taste and consider the *First Water*, the *Second*, and the *Third*; And you will finde them differing, not only in Strength and Weakness, but otherwise in Taste, or Odour; For it may be the *First Water* will have more of the Sent, as more Fragrant; And the *Second* more of the Taste, as more bitter or biting, &c.

Infusions in *Air* (for so we may call *Odours*) have the same diversities with *Infusions* in *Water*; In that the several *Odours* (which are in one Flower, or other Body) issue at several times; Some earlier, some later: So we finde that *Violets*, *Woodbines*, *Strawberries*, yeeld a pleasing Sent, that cometh forth first; But soon after an ill Sent quite differing from the Former. Which is caused not so much by Mellowing, as by the late Issuing of the Grosser Spirit.

As we may desire to extract the finest Spirits in some Cases; So we may desire also to discharge them (as hurtful) in some other. So *Wine burnt*, by reason of the Evaporating of the finer Spirit, in flameth less, and is best in Agues: *Opium* leeseeth some of his poysonous Quality, if it be vapoured out, mingled with spirit of *Wine*, or the like : *Sean* leeseeth somewhat of his windiness by Decocting; And (generally) subtile or windy Spirits are taken off by Incension, or Evaporation. And even in *Infusions* in things that are of too high a Spirit, you were better pour off the first *Infusion*, after a small time, and use the latter.

Bubbles are in the form of an Hemisphere; Air within, and a little Skin of *Water* without : And it seemeth somewhat strange, that the Air should rise so swiftly, while it is in the *Water*; And when it cometh to the top, should be stayed by so weak a Cover, as that of the Bubble is. But as for the swift Ascent of the Air, while it is under the *Water*, that is a Motion of Percussion from the *Water*; which it self descending, driveth up the Air, and no Motion of Levity in the Air. And this *Democritus* called

Experiment Solitary, touching the Appetite of Continuation in Liquids.

24.

called *Motus Plage*. In this Common *Experiment*, the Cause of the Enclosure of the *Bubble* is for that the Appetite to resist Separation, or Discontinuance (which in solid *Bodies* is strong) is also in *Liquors*, though fainter and weaker; As we see in this of the *Bubble*: we see it also in little Glasses of Spittle that Children make of Rushes; And in Castles of Bubbles, which they make by blowing into *water*, having obtained a little degree of Tenacity by Mixture of Soap: We see it also in the *Stillicides* of *water*, which, if there be *water* enough to follow, will draw themselves into a small thred, because they will discontinue; But if there be no Remedy, then they cast themselves into round Drops; which is the Figure, that saveth the Body most from Discontinuance: The same Reason is of the Roundness of the *Bubble*, as well for the Skin of *Water*, as for the *Air* within: For the *Air* likewise avoideth *Discontinuance*; And therefore casteth it self into a round Figure. And for the stop and arrest of the *Air* a little while, it sheweth, that the *Air* of it self hath little, or no Appetite of Ascending.

Experiment
Solitary, touching the making of Artificial Springs.

25.

THE Rejection, which I continually use, of *Experiments* (though it appeareth not) is infinite; But yet if an *Experiment* be probable in the Work, and of great Use, I receive it, but deliver it as doubtful. It was reported by a Sober Man, that an *Artificial Spring* may be made thus: Find out a hanging Ground, where there is a good quick Fall of Rain-water. Lay a Half-Trough of Stone, of a good length, three or four foot deep within the same Ground; with one end upon the high Ground, the other upon the low: Cover the Trough with Brakes a good thickness, and cast Sand upon the Top of the Brakes: You shall see (saith he) that after some showres are past, the lower end of the Trough will be like a *Spring* of *water*: which is no marvel, if it hold, while the Rain-water lasteth; But he said it would continue long time after the Rain is past: As if the *water* did multiply it self upon the *Air*, by the help of the Coldness and Condensation of the Earth, and the Consort of the first *Water*.

Experiment
Solitary, touching the Venomous Quality of mans flesh.

26.

THE *French* (which put off the Name of the *French Disease*, unto the Name of the *Disease* of *Naples*) do report, that at the Siege of *Naples*, there were certain wicked Merchants that barrell'd up *Mans Flesh* (of some that had been lately slain in *Barbary*) and sold it for *Tunney*; And that, upon that foul and high Nourishment, was the Original of that *Disease*. Which may well be; For that it is certain, that the *Canibals*, in the *West-Indies*, eat *Mans flesh*; And the *West-Indies* were full of the Pocks when they were first discovered: And at this day the *Mortalest* poysons, practised by the *West-Indians*, have some Mixture of the Blood, or Fat, or *Flesh* of *Man*: And divers *Witches*, and *Sorceresses*, as well amongst the *Heathens*, as amongst the *Christians*, have fed upon *Mans flesh*, to aid (as it seemeth) their Imagination, with high and foul Vapours.

Experiment
Solitary, touching the Version and Transmutation of Air into Water.

27.

IT seemeth that there be these waies (in likelihood) of Version of *Vapours* or *Air*, into *Water* and *Moisture*. The first is *Cold*; which doth manifestly Condense; as we see in the Contracting of the *Air* in the *Weather-Glass*; whereby it is a degree nearer to *Water*. We see it also in the Generation of *Springs*, which the *Ancients* thought (very probably) to be made by the Version of *Air* into *Water*, holpen by the *Rest*, which the *Air* hath in those Parts; whereby it cannot dissipate. And by the coldness of *Rocks*; for there

there *Springs* are chiefly generated. We see it also in the Effects of the *Cold* of the *Middle Region* (as they call it) of the *Air*; which produceth *Dews*, and *Rains*. And the Experiment of Turning *Water* into *Ice*, by *Snow*, *Nitre*, and *Salt* (whereof we shall speak hereafter) would be transferred to the Turning of *Air* into *Water*. The second way is by *Compression*; As in *Stillatories*, where the Vapour is turned back, upon it self, by the Encounter of the Sides of the *Stillatory*; And in the *Dew* upon the Covers of *Boyling Pots*. And in the *Dew* towards *Rain*, upon *Marble*, and *Wainscot*. But this is like to do no great effect; except it be upon Vapours, and gross *Air*, that are already very near in Degree to *Water*. The Third is that, which may be searched into, but doth not yet appear; which is, by *Mingling* of moist Vapours with *Air*; and trying if they will not bring a Return of more *Water*, than the *Water* was at first: For if so; That Increase is a *Version* of the *Air*: Therefore put *Water* into the bottom of a *Stillatory*, with the *Neb* stopped; Weigh the *Water* first; Hang in the Middle of the *Stillatory* a large *Sponge*; And see what Quantity of *Water* you can crush out of it; And what it is, more, or less, compared with the *Water* spent; for you must understand, that if any *Version* can be wrought, it will be easily done in small Pores: And that is the Reason why we prescribe a *Sponge*. The Fourth way is probable also, though not appearing; Which is, by *Receiving* the *Air* into the small Pores of *Bodies*; For (as hath been said) every thing in small Quantity is more easie for *Version*; And Tangible Bodies have no pleasure in the consort of *Air*, but endeavour to subact it into a more *Dense Body*: But in *Entire Bodies* it is checked; because, if the *Air* should Condense, there is nothing to succeed: Therefore it must be in loose Bodies, as *Sand*, and *Powder*, which we see, if they lye close, of themselves gather Moisture.

IT is reported by some of the *Ancients*; That *Whelps*, or other *Creatures*, if they be put young into such a *Cage*, or *Box*, as they cannot rise to their Stature, but may increase in Breadth, or Length will grow accordingly, as they can get Room: which if it be true, and faisible, and that the young *Creature* so pressed, and straightned, doth not thereupon dye; It is a Means to produce *Dwarf Creatures*, and in a very strange Figure. This is certain, and noted long since; That the Pressure, or Forming of Parts of *Creatures*, when they are very young, doth alter the shape not a little; As the Stroaking of the Heads of *Infants*, between the Hands, was noted of Old, to make *Macrocephali*; which shape of the Head, at that time, was esteemed. And the raising gently of the Bridge of the Nose, doth prevent the Deformity of a Saddle Nose. Which observation well weighed, may teach a Means, to make the Persons of Men, and Women, in many kinds, more comely and better featured, than otherwise they would be; By the Forming and Shaping of them in their Infancy: As by Stroaking up the Calves of the Legs, to keep them from falling down too low; And by Stroaking up the Forehead, to keep them from being low Foreheaded. And it is a common Practice to swathe *Infants*, that they may grow more straight, and better shaped: And we see Young Women, by wearing straight Bodies, keep themselves from being Gross and Corpulent.

Experiment
Solitary, touch-
ing *Helps*
towards the
Beauty & good
Features of
Persons.
28.

Others, as they hang, will many of them shoot forth; and so will *Pennycuik*; and so will an Herb called *Orpin*; with which they use, in the Country, to trim their Houses, binding it to a Lath, or Stick, and setting it against a wall. We see it likewise, more especially, in the greater

Experiment
Solitary, touch-
ing the Con-
densing of Air
in such sort as
it may put on
Weight, and
yeild Nourish-
ment.
29.

Semper-vive, which will put out Branches, two or three years: But it is true, that commonly they wrap the Root in a Cloth besmeared with Oyl; and renew it once in a half year. The like is reported by some of the *Ancients* of the *Stalks of Lillies*. The Cause is, for that these *Plants* have a Strong Dense, and Succulent Moisture, which is not apt to exhale; and so is able, from the Old store, without drawing help from the Earth, to suffice the sprouting of the *Plant*: And this sprouting is chiefly in the late Spring, or early Summer; which are the times of Putting forth. We see also, that *Stumps of Trees*, lying out of the ground, will put forth Sprouts for a time. But it is a Noble Tryal, and of very great Consequence, to try whether these things, in the Sprouting, do encrease *Weight*; which must be tryed, by weighing them before they be hang'd up; and afterwards again, when they are sprouted. For if they encrease not in *Weight*; then it is no more but this; That what they send forth in the Sprout, they leese in some other part: But if they gather *Weight*, then it is *Magnale Naturæ*; For it sheweth, that *Air* may be made so to be Condensed, as to be converted into a *Dense Body*; whereas the Race and Period of all things, here above the Earth, is to extenuate and turn things to be more *Pneumatical*, and Rare; And not to be Retrograde, from *Pneumatical* to that which is *Dense*. It sheweth also that *Air* can *Nourish*; which is another great Matter of Consequence. Note, that to try this, the *Experiment* of the *Semper-vive*, must be made without Oyling the Cloth; For else, it may be, the *Plant* receiveth Nourishment from the Oyl.

Experiment
Solitary, touch-
ing the Com-
mixture of
Flame & Air,
and the great
Force thereof.

30.

Flame and Air do not Mingle, except it be in an *Instant*; Or in the *Vital Spirits* of *Vegetables*, and *living Creatures*. In *Gunpowder*, the Force of it hath been ascribed, to Rarefaction of the Earthly Substance into *Flame*. And thus far it is true: And then (forsooth) it is become another Element; the Form whereof occupieth more place; And so, of Necessity, followeth a Dilatation: and therefore, lest two bodies should be in one place, there must needs also follow an Expulsion of the Pellet; or blowing up of the Mine. But these are crude and Ignorant Speculations. For *Flame*, if there were nothing else except it were in a very great quantity, will be suffocate with any hard body, such as a *Pellet* is; or the Barrel of a Gun; so as the *Flame* would not expel the hard body; but the hard body would kill the *Flame*, and not suffer it to kindle, or spread. But the Cause of this so potent a Motion, is the *Nitre* (which we call otherwise *Salt-Peter*) which having in it a notable crude and windy Spirit, first by the Heat of the Fire suddenly dilateth it self; (and we know that simple *Air*, being preternaturally attenuated by Heat, will make it self Room, and break, and blow up that which resisteth it.) And secondly, when the *Nitre* hath dilated it self, it bloweth abroad the *Flame* as an inward Bellows. And therefore we see that *Brimstone*, *Pitch*, *Camphire*, *Wild-fire*, and divers other Inflammable Matters; though they burn cruelly, and are hard to quench; Yet they make no such fiery wind, as *Gunpowder* doth: And on the other side, we see that *Quick-silver* (which is a most Crude and Watry Body) heated, and pent in, hath the like force with *Gunpowder*. As for *living Creatures*, it is certain, their *Vital Spirits* are a Substance compounded of an *Airy* and *Flamy* Matter; and though *Air* and *Flame*, being free, will not well mingle; yet bound in by a *Body* that hath some fixing, they will. For that you may best see in those two Bodies (which are their *Aliments*) *Water*, and *Oyl*; for they likewise will not well mingle of themselves, but in the Bodies of *Plants*, and

and *Living Creatures*, they will. It is no marvel therefore, that a small *Quantity of Spirits*, in the Cels of the Brain, and Cannals of the sinews, are able to move a whole body (which is of so great Mass) both with so great force, as in Wrestling, Leaping; and with so great swiftness, as in playing Division upon the *Lute*. Such is the force of these two Natures, *Air* and *Flame* when they incorporate.

TAKE a small *Wax-Candle*, and put it in a Socket of Brass, or Iron; then set it upright in a Porringer full of *Spirit of Wine*, heated: Then set both the *Candle*, and *Spirit of wine*, on fire, and you shall see the *Flame* of the *Candle* open it self, and become four or five times bigger than otherwise it would have been; and appear in figure *Globular*, and not in *Pyramis*. You shall see also that the Inward *Flame* of the *Candle* keepeth colour, and doth not wax any whit blew towards the colour of the outward *Flame* of the *Spirit of Wine*. This is a noble *Instance*, wherein two things are most remarkable; The one, that one *Flame* within another quencheth not, but is a fixed Body, and continueth as *Air*, or *Water* do. And therefore *Flame* would still ascend upwards in one greatness, if it were not quenched on the *sides*: And the greater the *Flame* is at the bottome, the higher is the rise. The other, that *Flame* doth not mingle with *Flame*, as *Air* doth with *Air*, or *Water* with *Water*, but only remaineth contiguous; as it cometh to pass betwixt Consisting Bodies. It appeareth also, that the form of a *Pyramis* in *Flame*, which we usually see, is meerly by accident, and that the *Air* about, by quenching the sides of the *Flame*, crusheth it, and extenuateth it into that form; for of it self it would be round: And therefore *Smok* is in the figure of a *Pyramis* Reversed; for the *Air* quencheth the *Flame*, & receiveth the *Smok*. Note also, that the *Flame* of the *Candle* within the *Flame* of the *Spirit of wine*, is troubled; and doth not only open and move upwards, but moveth waving, and to and fro: As if *Flame* of his own Nature, (if it were not quenched) would rowl and turn as well as move upwards. By all which it should seem, that the *Cœlestial Bodies*, (most of them) are true *Fires* or *Flames*, as the *Stoicks* held; More fine (perhaps) and *Rarified*, than our *Flame* is. For they are all *Globular*, and *Determinate*; they have *Rotation*, and they have the colour and splendour of *Flame*: So that *Flame* above is durable and consistent, and in his *Natural* place; but with us, it is a stranger, and momentany, and impure; like *Vulcan* that halted with his fall.

Experiment
Solitary, touch-
ing the Se-
cret Nature of
Flame.

31.

TAKE an *Arrow*, and hold it in *Flame*, for the space of ten pulses; and when it cometh forth, you shall finde those parts of the *Arrow*, which were one the outsides of the *Flame*, more burned, blacked, and turned almost into a Coal; whereas that in the midst of the *Flame*, will be as if the *Fire* had scarce touched it. This is an *Instance* of great consequence for the discovery of the Nature of *Flame*; and sheweth manifestly, that *Flame* burneth more violently towards the sides, than in the midst: And, which is more, that *Heat* or *Fire* is not violent or furious, but where it is checked and pent. And therefore the *Peripateticks* (howsoever their opinion of an *Element* of *Fire* above the *Air* is justly exploded) in that Point they acquit themselves well: For being opposed, that if there were a *Sphere* of *Fire*, that incompassed the *Earth* so near hand, it were impossible, but all things should be burnt up; they answer, that the pure *Elemental Fire*, in his own place, and not irritate, is but of a *Moderate Heat*.

Experiment
Solitary, touch-
ing the Dif-
ferent force of
Flame in the
midst, and on
the sides.

32.

It

Experiment
Solitary, touch-
ing the De-
crease of the
Natural motion
of Gravity in
great distance
from the earth;
or within some
depth of the
earth.

33.

Experiment
Solitary, touch-
ing the Con-
traction of Bo-
dies in bulk, by
the mixture of
the more Li-
quid Body
with the more
Solid.

34.

Experiment
Solitary, touch-
ing the ma-
king Vines
more fruitful.

35.

Experiments
in Consort
touching Pur-
ging Medicines.

36.

IT is affirmed constantly by many, as an usual Experiment; That a *Lump of Ure*, in the *Bottom* of a Mine, will be tumbled, and stirred by two Mens strength; which if you bring it to the *Top* of the Earth, will ask six Mens strength at the least to stir it. It is a Noble Instance, and is fit to be tryed to the full: For it is very probable, that the *Motion of Gravity* worketh weakly, both far from the Earth, and also within the Earth: The former, because the appetite of Union of Dense Bodies with the Earth, in respect of the distance, is more dull: The latter, because the Body hath in part attained his Nature, when it is some Depth in the Earth. For as for the Moving to a *Point* or place (which was the Opinion of the *Ancients*) it is a meer vanity.

IT is strange, how the *Ancients* took up Experiments upon credit, and yet did build great Matters upon them. The observation, of some of the best of them, delivered confidently, is, That a *Vessel* filled with *Ashes*, will receive the like quantity of *Water*, that it would have done if it had been empty. But this is utterly untrue, for the *Water* will not go in by a fifth part. And I suppose, that that fifth part is the difference of the lying close, or open of the *Ashes*; as we see that *Ashes* alone, if they be hard pressed, will lye in less room: and so the *Ashes* with *Air* between, lye looser; and with *Water* closer. For I have not yet found certainly, that the *Water*, it self, by mixture of *Ashes* or *Dust*, will shrink or draw into less room.

IT is reported of credit, that if you lay good store of *Kernels* of *Grapes*, about the *Root* of a *Vine*, it will make the *Vine* come earlier, and prosper better. It may be tryed with other *Kernels*, laid about the *Root* of a Plant of the same kind; as *Figs*, *Kernels* of *Apples*, &c. The Cause may be, for that the *Kernels* draw out of the Earth Juice fit to nourish the *Tree*, as those that would be *Trees* of themselves, though there were no *Root*; but the *Root* being of greater strength, robbeth and devoureth the Nourishment, when they have drawn it: As great *Fishes* devour little.

THE Operation of *Purging Medicines*, and the Causes thereof, have been thought to be a great Secret; and so according to the slothful manner of Men, it is referred to a *Hidden Propriety*, - a *Specificall Vertue*, and a *Fourth Quality*, and the like shifts of Ignorance. The Causes of *Purging* are divers; all plain and perspicuous, and thoroughly maintained by Experience. The first is, That whatsoever cannot be overcome and digested by the *Stomack*, is by the *Stomack*, either put up by *Vomit*, or put down to the *Guts*; and by that *Motion of Expulsion* in the *Stomack*, and *Guts*, other *Parts of the Body* (as the *Orifices* of the *Veins*, and the like) are moved to expel by *Consent*. For nothing is more frequent than *Motion of Consent* in the *Body of Man*. This Surcharge of the *Stomack*, is caused either by the *Quality* of the *Medicine*, or by the *Quantity*. The *Qualities* are three: *Extreme Bitter*, as in *Aloes*, *Coloquintida*, &c. *Loathsome*, and of horrible taste; as in *Agarik*, *Black Hellebore*, &c. And of *secret Malignity*, and disagreement towards *Mans Body*, many times not appearing much in the Taste; as in *Scammony*, *Machoacham*, *Antimony*, &c. And note well, that if there be any *Medicine* that *Purgeth*, and hath neither of the first two *Manifest Qualities*; is to be held suspected as a kind of *Poyson*; For that it worketh either by *Corrosion*, or by a *secret Malignity*, and Enmity to Nature: and therefore such *Medicines* are warily to be prepared, and used. The *Quantity* of that which is taken, doth also cause *Purging*; as we see in a great *Quantity* of *New Milk* from the *Cow*; yea and a great *Quantity* of *Meat*; For

Surfeits

Surfets many times turn to *Purges*, both upwards, and downwards. Therefore we see generally, that the working of *Purging Medicines* cometh two or three hours after the *Medicines* taken; For that the *Stomach* first maketh a proof, whether it can concoct them. And the like happeneth after *Surfets*; or *Milk* in too great quantity.

A second Cause is *Mordication* of the *Orifices* of the *Parts*; especially of the *Mesentery veines*; as it is seen, that *Salt*, or any such thing that is sharp and biting, put into the *Fundament*, doth provoke the part to expel; and *Mustard* provoketh sneezing: And any sharp thing to the eyes provoketh tears. And therefore we see, that almost all *Purgers* have a kind of *Twitching* and *vellication*, besides the *gripping*, which cometh of wind. And if this *mordication* be in an over-high degree, it is little better than the *corosion* of *poysons*, and it cometh to pass sometimes in *Antimony*; especially if it be given to bodies not repleat with humors; for where humours abound; the humours save the parts.

The third Cause is *Attraction*: For I do not deny, but that *Purging Medicines* have in them a direct force of *Attraction*; as *Drawing Plaisters* have in *Surgery*: And we see *Sage*, or *Bittony* bruised, *sneezing-powder*, and other *powders* or *Liquors* (which the *Physicians* call *Errhines*) put into the *Nose*, draw *flegme* and water from the *Head*; and so it is in *Apoplegmatismes*, and *Gargarismes*, that draw the *Rheume* down by the *Palat*. And by this vertue, no doubt, some *Purgers* draw more one humour, and some another, according to the opinion received: As *Rubarb* draweth *Choler*; *Sean Melancholy*; *Agarick Flegme*, &c. But yet (more or less) they draw promiscuously. And note also, that besides *Sympathy*, between the *Purger* and the *Humour*, there is also another Cause, why some *Medicines* draw some humour more than another. And it is, for that some *Medicines* work quicker than others: And they that draw quick, draw only the lighter, and more fluid humours; they that draw slow, work upon the more tough, and viscid humours. And therefore, men must beware how they take *Rubarb*, and the like, alone, familiarly; For it taketh onely the lightest part of the humour away, and leaveth the Mass of humours more obstinate. And the like may be said of *Worm-wood*; which is so much magnified.

The fourth Cause is *Flatulosity*: For wind stirred moveth to expel: And we find that (in effect) all *Purgers* have in them a raw *Spirit*, or *Wind*; which is the principal Cause of *Tortion* in the *Stomach*, and *Belly*. And therefore *Purgers* leese (most of them) the vertue, by decoction upon the fire; and for that Cause are chiefly given in *Infusion*, *Juyce*, or *Powder*,

The fifth Cause is *Compression*, or *Crushing*: As when *Water* is crushed out of a *sponge*: So we see that *Taking Cold* moveth looseness by contraction of the skin, and outward parts; and so doth *Cold* likewise cause *Rheumes*, and *Defluctions* from the *Head*; and some *Astringent Plaisters* crush out purulent Matter. This kind of Operation is not found in many *Medicines*: *Mirabolanes* have it; and it may be the *Barks* of *Peaches*; for this vertue requireth an *Astriction*; but such an *Astriction*, as is not grateful to the Body (for a pleasing *Astriction* doth rather binde in the humours, than expel them:) And therefore such *Astriction* is found in things of an harsh Taste.

The sixth Cause is *Lubrefaction*, and *Relaxation*: As we see in *Medicines Emollient*, such as are *Milk*, *Honey*, *Mallowes*, *Lettuce*, *Mercurial*, *Pellitory of the Wall*, and others. There is also a secret vertue of *Relaxation* in *Cold*: For the heat of the Body bindeth the Parts and Humours together, which

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41

Cold, relaxeth: As it is seen in *Urine*, *Blood*, *Pottage*, or the like; which, if they be *Cold*, break, and dissolve. And by this kind of *Relaxation*, *Fear* looseth the *Belly*; because the heat retiring inwards towards the heart, the guts, and other parts are relaxed; in the same manner as *Fear* also causeth trembling in the sinews. And of this kind of *Purgers* are some *Medicines* made of *Mercury*.

42 The seventh Cause is *Absterfion*; which is plainly a *scouring off*, or *Incision* of the more visciduous humours, and making the humours more fluid; and cutting between them, and the part. As is found in *Nitrous Water*, which scoureth *Linnen Cloth* (speedily) from the Foulness. But this *Incision* must be by a *Sharpness*, without *Astirition*: which we finde in *Salt*, *Wormwood*, *Oxymel*, and the like.

43 There be *Medicines*, that move *Stools*, and not *Urine*; Some other, *Urine*, and not *Stools*. Those that *Purge by Stool*, are such as enter not at all, or little into the *Mesentery veins*; But either at the first are not digestible by the *Stomach*, and therefore move immediately downwards to the *Guts*; or else are afterwards rejected by the *Mesentery Veins*, and so turn likewise downwards to the *Guts*; and of these two kinds are most *Purgers*. But those that move *Urine*, are such as are well digested of the *Stomach*, and well received also of the *Mesentery Veins*; so they come as far as the *Liver*, which sendeth *Urine* to the *Bladder*, as the *Whey of Blood*; And those *Medicines*, being *Opening* and *Piercing*, do fortifie the *Operation* of the *Liver*, in sending down the wheyey part of the *Blood* to the *Reins*. For *Medicines Urinative* do not work by *Rejection*, and *Indigestion*, as *Solutive* do.

44 There be divers *Medicines*, which in greater *Quantity*, move *Stool*, and in smaller, *Urine*: And so contrariwise, some that in greater *Quantity*, move *Urine*, and in smaller *Stool*. Of the former sort is *Rubarb*, and some others. The Cause is, for that *Rubarb* is a *Medicine*, which the *Stomach* in a small quantity doth digest, and overcome (being not *Flatuous*, nor *Loathsome*;) and so sendeth it to the *Mesentery Veins*; and so being opening, it helpeth down *Urine*: But in a greater *Quantity*, the *Stomach* cannot overcome it, and so it goeth to the *Guts*. *Pepper*, by some of the *Ancients*, is noted to be of the second sort; which being in small *Quantity*, moveth wind in the *Stomach* or *Guts*, and so expelled by *Stool*; but being in greater *Quantity*, dissipateth the *Winds*; and it self getteth to the *Mesentery Veins*; and so to the *Liver*, and *Reins*; where, by *Heating* and *Opening*, it sendeth down *Urine* more plentifully.

Experiments
in Confort touch-
ing Meats &
Drinks that are
most nourishing

45

WE have spoken of *Evacuating* of the *Body*, we will now speak something of the *Filling* of it by *Restoratives* in *Consumptions*, and *Emaciating Diseases*. In *Vegetables*, there is one part that is more *Nourishing* than another; As *Grains* and *Roots* nourish more than the *Leaves*; insomuch as the *Order* of the *Foliatanes* was put down by the *Pope*, as finding *Leaves* unable to nourish *Mans Body*. Whether there be that difference, in the *Flesh* of *Living Creatures*, is not well enquired: As whether *Livers*, and other *Entrails*, be not more nourishing, than the *Outward Flesh*. We finde that amongst the *Romans*, a *Goose's Liver* was a great delicacy; insomuch as they had *Artificial* means to make it fair, and great; but whether it were more nourishing appeareth not. It is certain, that *Marrow* is more nourishing than *Fat*. And I conceive that some *Decoction* of *Bones*, and *Sinews*, stamped, and well strained, would be a very *Nourishing Broth*: We finde also, that *Scotch Skjack*; (which is a *Pottage* of strong *Nourishment*) is made

made with the *Knees*, and *Sinews* of *Beef*, but long boiled: *Jelly* also, which they use for a Restorative, is chiefly made of *Knuckles* of *Veal*. The *Pulp*, that is within the *Crawfish* or *Crab*, which they spice and butter, is more Nourishing than the *Flesh* of the *Crab*, or *Crawfish*. The *Yolks* of *Eggs* are clearly more Nourishing than the *Whites*. So that it should seem, that the *Parts* of *Living Creatures*, that lie more Inwards, nourish more than the outward *Flesh*: Except it be the *Brain*, which the *Spirits* prey too much upon, to leave it any great Vertue of Nourishing. It seemeth for the Nourishing of Aged Men, or Men in Consumptions, some such thing should be Devised, as should be half *Chylus*, before it be put into the Stomach.

Take two large *Capons*: perboile them upon a soft fire, by the space of an hour, or more, till in effect all the Blood be gone. Adde in the Decoction the *Pill* of a *Sweet Limon*, or a good Part of the *Pill* of a *Citron*, and a little *Mace*. Cut off the *Shanks*, and throw them away. Then with a good strong Chopping-knife, mince the two *Capons*, bones and all, as small as ordinary minced Meat; put them into a large neat Boulter; then take a Kilderkin, sweet, and well seasoned, of four Gallons of Beer, of 8, s. strength, new as it cometh from the Tunning; Make in the Kilderkin a great Bung-hole of purpose: Then thrust into it, the Boulter (in which the *Capons* are) drawn out in length; Let it steep in it three days, and three nights, the Bung-hole open, to work; Then close the Bung-hole, and so let it continue, a day and a half; Then draw it into bottles, and you may drink it well after 3 days Bottling; And it will last six weeks (approved) It drinketh fresh, flowreth & mantleth exceedingly; It drinketh not newish at all; It is an excellent Drink for a Consumption, to be drunk either alone, or Carded with some other Beer. It quencheith thirst, and hath no whit of windiness. Note, that it is not possible, that Meat and Bread, either in Broths, or taken with Drink, as is used, should get forth into the Veins, and outward Parts, so finely, and easily, as when it is thus Incorporated, and made almost a *Chylus* aforehand.

Triall would be made of the like Brew with *Potado-Roots*, or *Em-Roots*, or the *Pith* of *Artichokes*, which are nourishing Meats: It may be tried also, with other flesh; As *Pheasant*, *Partridge*, *Young Porke*, *Pig*, *Venison*, especially of young *Deer*, &c.

A *Mortress* made with the *Brawn* of *Capons*, stamped, and strained, and mingled (after it is made) with like quantity, (at the least) of *Almond Butter*; is an excellent Meat to nourish those that are weak; Better than *Black-Manger* or *Jelly*: And so is the *Cullice* of *Cocks*, boiled thick with the like Mixture of *Almond Butter*: For the *Mortress*, or *Cullice*, of it self, is more Savory and strong; And not so fit for Nourishing of weak Bodies; But the *Almonds*, that are not of so high a tast as *Flesh*, do excellently qualifie it.

Indian Maiz hath (of certain) an excellent Spirit of Nourishment; But it must be thoroughly boiled, and made into a *Maiz-Cream* like a *Barley-Cream*. I judge the same of *Rice*, made into a *Cream*; For *Rice* is in *Turky*, and other Countries of the East, most fed upon; But it must be thoroughly boiled in respect of the Hardness of it: And also because otherwise it bindeth the Body too much.

Pistachoes, so they be good, and not musty, joynd with *Almonds* in *Almond Milk*; Or made into a *Milk* of themselves, like unto *Almond Milk*, but more green, are an excellent Nourisher. But you shall do well, to adde a little *Ginger*, scraped, because they are not without some subtil windiness.

51

Milk warm, from the Cow, is found to be a great Nourisher, and a good Remedy in *Consumptions*: But then you must put into it, when you Milk the Cow, two little bags; the one of *Powder of Mint*, the other of *Powder of Red Roses*; For they keep the *Milk* somewhat from Turning, or Crudling in the Stomach; and put in Sugar also, for the same cause and partly for the Taste sake; But you must drink a good draught, that it may stay less time in the Stomach, lest it Crudle: And let the Cup into which you milk the Cow, be set in a greater Cup of hot water; that you may take it warm. And *Cow-milk* thus prepared, I judge to be better for a *Consumption*, than *Ass-milk*, which (it is true) turneth not so easily, but it is a little harriſh; Marry it is more proper for Sharpness of Urine, and Exulceration of the Bladder, and all manner of Lenifyings. *Womens-milk* likewise is prescribed, when all fail; but I commend it not; as being a little too near the Juyc of Mans Body, to be a good Nourisher; Except it be in *Infants*, to whom it is Naturall.

52

Oyl of Sweet Almonds, newly drawn, with Sugar and a little Spice, spread upon Bread tosted, is an Excellent Nourisher; But then to keep the *Oyl* from frying in the Stomach, you must drink a good draught of Milde Beer after it; and to keep it from relaxing the Stomach too much, you must put in a little Powder of Cinnamon.

53

The *Tolks of Eggs* are of themselves so well prepared by Nature for Nourishment; As (so they be Potched, or Reare boyled) they need no other Preparation, or Mixture; yet they may be taken also raw, when they are new laid, with *Malmesey*, or *Sweet Wine*; You shall do well to put in some few Slices of *Eringium Roots*, and a little *Amber-grice*; For by this meanes, besides the immediate Faculty of Nourishment, such Drink will strenghten the Back, so that it will not draw down the *Urine* too fast. For too much *Urine* doth always hinder Nourishment.

54

Mincing of Meat, as in *Pies*, and *Buttered Minced Meat*, saveth the Grinding of the Teeth; and therefore (no doubt) it is more Nourishing; Especially in Age; Or to them that have weak Teeth; But the Butter is not so proper for weak Bodies; and therefore it were good to moisten it with a little *Claret Wine*, *Pill of Limon* or *Orange* cut small, Sugar, and a very little Cinnamon, or Nutmeg. As for *Chuetts*, which are likewise minced Meat, in stead of Butter, and Fat, it were good to moisten them, partly with *Creame*, or *Almond*, or *Pistachomilk*, or *Barley*, or *Maiz Creame*; adding a little *Coriander-Seed*, and *Carraway Seed*, and a very little *Saffron*. The more full Handling of *Alimentation* we reserve to the due place.

We have hitherto handled the Particulars, which yield best, and easiest, and plentifullest Nourishment; And now we will speak of the best Meanes of Conveying, and Converting the Nourishment.

55

The First *Meanes* is, to procure that the Nourishment may not be robbed, and drawn away; wherein that, which we have already said, is very Material; to provide, that the *Reins* draw not too strongly an over-great Part of the *Blood* into *Urine*. To this adde that Precept of *Aristotle* that *Wine* be forborne in all *Consumptions*; for that the *Spirits* of the *Wine*, do prey upon the *Roside Juyc* of the Body, and inter-common with the *Spirits* of the body, & so deceive and rob them of their nourishment. And therefore if the *Consumption*, growing from the weakness of the Stomach, do force you to use *Wine*, let it always be burnt, that the quicker *Spirits* may evaporate, or at the least quenched with two little wedges of Gold, 6 or 7 times repeated. Adde also this Provision, that there be not too much Expence of

of the *Nourishment*, by *Exhaling*, and *Sweating*: And therefore if the Patient be apt to sweat, it must be gently restrained. But Chiefly *Hipocrates* Rule is to be followed, who adviseth quite contrary to that which is in use: Namely, that the *Linnen*, or *Garment* next the *Flesh*, be in *Winter* dry and oft changed; And in *Summer* seldome changed, and smeared over with oyle; For certain it is, that any substance, that is fat, doth a little fill the Pores of the body and stay Sweat, in some Degree. But the more cleanly way is to have the *Linnen* smeared lightly over with *Oil of Sweet Almonds*; And not to forbear shifting as oft as is fit.

The Second *Meanes* is to send forth the *Nourishment* into the Parts more strongly; for which, the working must be by *strengthening* of the *Stomack*; And in this because the *Stomack* is chiefly comforted by *Wine*, and *Hot things*, which otherwise hurt, it is good to resort to *Outward Applications* to the *Stomack*: Wherein it hath been tried, that the *Quilts* of *Roses*, *Spices*, *Mastick*, *Wormwood*, *Mint*, &c. are nothing so helpfull, as to take a *Cake* of *New Bread* and to bedew it with a little *Sack*, or *Alegant*; And to drie it; And after it be dried a little before the *Fire*, to put it within a clean *Napkin*, and to lay it to the *Stomack*: For it is certain, that all *Flower* hath a potent *Vertue* of *Astriction*; Inasmuch as it hardeneth a piece of *flesh*, or a *Flower* that is laid in it: And therefore a *Bag* quilted with *Bran*, is likewise very good; but it drieth somewhat too much and therefore it must not ly long.

The Third *Meanes* (which may be a branch of the former) is to send forth the *Nourishment* the better by *Sleep*. For we see, that *Bears*, and other *Creatures* that sleep in the *Winter*, was exceeding fat: and certain it is, (as it is commonly believed) that *Sleep* doth nourish much; both for that the *Spirits* do less spend the *Nourishment* in *sleep*, than when living *Creatures* are awake: And because (that which is to the present purpose) it helpeth to thrust out the *Nourishment* into the Parts. Therefore in *Aged men*, and weak *Bodies*, and such as abound not with *Choler*, a short *Sleep* after dinner doth help to *Nourish*; For in such *Bodies* there is no fear of an over-hasty *Digestion*, which is the inconvenience of *Post-meridian Sleeps*. *Sleep* also in the *Morning* after the taking of somewhat of easie *Digestion*; As *Milk* from the *Cow*, *Nourishing Broth*, or the like, doth further *Nourishment*: But this would be done sitting upright, that the *Milk* or *Broth* may passe the more speedily to the bottome of the *Stomack*.

The Fourth *Meanes* is to provide that the Parts themselves may draw to them the *Nourishment* strongly. There is an excellent observation of *Aristotle*; that a great reason, why *Plants* (some of them) are of greater age, than *Living Creatures*, is, for that they yearly put forth new *Leaves* and *Boughs*; whereas *Living Creatures* put forth (after their period of *Growth*) nothing that is young but *Hair* and *Nailles*, which are *Excrements* and no Parts. And it is most certain, that whatsoever is young, doth draw *Nourishment* better, than that which is Old; and then (that which is the *Mysterie* of that Observation) young *Boughs* and *Leaves*, calling the *Sap* up to them; the same nourisheth the *Body* in the *Passage*. And this we see notably proved also in that the oft cutting, or *Polling* of *Hedges*, *Trees*, and *Herbs*, doth conduce much to their lasting. Transfere therefore this Observation to the *Helping* of *Nourishment* in *Living Creatures*: The Noblest and Principall Use whereof is, for the *Prolongation* of *Life*: *Restauration* of some Degree of *Youth*; and *Inteneration* of the Parts: For certain it is, that there are in *Living Creatures* Parts that *Nourish*, and *Repair* easily; and Parts that

Nourish and repair hardly; And you must refresh, and renew those that are easie to Nourish, that the other may be refreshed, and (as it were) Drink in Nourishment in the Passage. Now we see that *Draught Oxen*, put into good Pasture recover the Flesh of young Beef; And Men after long Emaciating Diets, wax plump and fat, and almost new: So that you may surely conclude that the frequent and wise Use of those *Emaciating Diets*, and of *Purgings*; And perhaps of some kind of *Bleeding*, is a principall Meanes of *Prolongation of life*, and restoring some degree of *Youth*: For as we have often said, *Death cometh upon Living Creatures like the Torment of Mezentius,*

Mortua quinetiam jungebat Corpora vivis.

Componens Manibusque Manus, atque Oribus Ora.

For the Parts in Mans Body easily reparable, (as *Spirits, Blood, and Flesh*) dy in the Embrace of the parts hardly reparable, (as *Bones, Nerves, and Membranes*) and likewise some *Entrails* (which they reckon amongst the *Spermatick* and *Menstruall Parts*) be but a Conceit. And this same *Observation* also may be drawn to the present purpose of Nourishing Emaciated Bodies: And therefore *Gentle Friction* draweth forth the Nourishment, by making the Parts a little hungry and heating them; whereby they call forth Nourishment the better. This *Friction* I wish to be done in the Morning. It is also best done by the *Hand*, or a piece of *Scarlet-wool*, wet a little with *Oil of Almonds*, mingled with a small Quantity of *Eay-Salt*, or *Saffron*; We see that the very *Currying* of *Horses* doth make them fat, and in good liking.

59

The fifth Meanes is, to further the very *Act*, of *Assimilation* of Nourishment; which is done by some outward *Emollients*, that make the Parts more apt to *Assimilate*. For which I have compounded an *Ointment* of Excellent Odour, which I call *Roman Ointment*, vide the *Receit*. The use of it would be between Sleeps; For in the latter Sleep the Parts *Assimilate* chiefly.

Experiment
Solitary, touch-
ing *Filum*
Medicinale.

60

There be many *Medicines*, which by themselves would do no Cure, but perhaps Hurt, but being applyed in a certain Order, one after another, do great Cures. I have tried (my selfe) a *Remedy* for the *Gout*, which hath seldome failed, but driven it away in 24 hours space: It is first to apply a *Pulstasse*; of which vide the *Receit*; and then a *Bath* or *Fomentation*, of which vide the *Receit*; and then a *Plaster*, vide the *Receit*. The *Pulstasse* relaxed the Pores, and maketh the humour apt to Exhale. The *Fomentation* calleth forth the Humour by Vapours; But yet in regard of the way made by the *Pulstasse*, Draweth gently; And therefore draweth the Humours out; and doth not draw more to it; For it is a *Gentle Fomentation*, and hath with all a *Mixture* (though very little) of some *Stupefactive*. The *Plaster* is a Moderate *Astringent Plaster*, which repelleth new humour from falling. The *Pulstasse* alone would make the Part more soft, and weak; and apter to take the *Defluxion* and *Impression* of the Humour. The *Fomentation* alone, if it were too weak without way made by the *Pulstasse*, would draw forth little; If too strong it would dray to the Part as well as draw from it. The *Plaster* alone, would pen the Humour already contained in the Part, and so exasperate it, as well as forbid new Humor. Therefore they must be all taken in Order, as is said. The *Pulstasse* is to be laid to, for two or three Houres: The *Fomentation* for a Quarter of an Hour, or somewhat better, being used hot, and seven or eight times repeated: The *Plaster* to continue on still, till the Part be well confirmed.

There

THere is a secret Way of Cure, (unpractized by *Assuetude* of that which in it selfe hurteth. *Poysons* have been made by some, Familiar, as hath been said. *Ordinary Keepers*, of the Sick of the *Plague*, are seldome infected. *Enduring of Tortures*, by *Custome* hath been made more easie: The *Brooking* of Enormous *Quantity* of *Meats*, and so of *Wine*, or *strong Drink*, hath been, by *Custome*, made to be without *Surfe*. or *Drunkennesse*. And generally *Diseases* that are *Chronicall*, as *Coughs*, *Phthisikes*, some kinds of *Palsies*, *Lunacies*, &c. are most dangerous at the first: therefore a wise *Physitian* will consider whether a *Disease* be *Incurable*; Or whether the Just Cure of it be not full of peril; and if he finde it to be such, let him resort to *Palliation*, And *Alleviate* the *Symptome*, without busying himself too much with the perfect Cure: And many times, (if the *Patient* be indeed patient) that Course will exceed all Expectation. Likewise the *Patient* himselfe may strive, by little and little to overcome the *Symptome*, in the *Exacerbation*, and so, by time turne suffering into Nature.

Experiment
Solitary, touch-
ing Cure by
Custome.

61.

Divers *Diseases*, especially *Chronical*, (such as *Quartain Agues*) are sometimes cured by *Surfeit* and *Excesses*: As *Excesse* of *Meat*, *Excesse* of *Drink*, *Extraordinary Fasting*, *Extraordinary Stirring*, or *Lassitude*, and the like. The Cause is, for that *Diseases* of *Continuance* get an *Adventitious Strength* from *Custome*, besides their *Material Cause* from the *Humours*: So that the *Breaking* of the *Custome* doth leave them only to their first Cause; which if it be any thing weak will fall off. Besides, such *Excesses* do *Excite* and spur *Nature*, which thereupon riseth more forcibly against the *Disease*.

Experiment
Solitary, touch-
ing Cure by
Excesse.

62

THere is in the Body of Man a great *Consent* in the *Motion* of the severall *Parts*: Wee see it is *Childrens sport*, to prove whether they can rub upon their *Breast* with one hand, and pat upon their forehead with another; And straight wayes they shall sometimes rub with both hands, or pat with both hands. We see that when the *Spirits*, that come to the *Nostrils*, expell a bad *Sent*, the *Stomach* is ready to Expell by *Vomit*. We finde that in *Consumptions* of the *Lungs*, when Nature cannot expell by *Cough*, Men fall into *Fluxes* of the *Belly* and then they die. So in *Pestilent Diseases*, if they cannot be expelled by *Sweat*, they fall likewise into *Loosenesse*, and that is commonly *Mortal*. Therefore *Physitians* should ingeniously contrive, how by *Motions* that are in their *Power*, they may excite *Inward Motions* that are not in their *Power*, by *Consent*: as by the *Stench* of *Feathers* or the like they cure the *Rising* of the *Mother*.

Experiment
Solitary touch-
ing Cure by
Motion of Con-
sents

63

Hippocrates *Aphorisme*, In *Morbis Minus*, is a good profound *Aphorisme*. It importeth, that *Diseases* contrary to the *Complexion*, *Age*, *Sex*, *Season* of the year, *Diet*, &c. are more dangerous than those that are *Concurrent*. A Man would think it should be otherwise; For that when the *Accident* of *Sickness*, and the *Naturall Disposition*, do second the one the other, the *Disease* should be more forcible. And (so no doubt) it is; if you suppose like *Quantity* of *Matter*. But that which maketh good the *Aphorisme*, is, because such *Diseases* do shew a greater *Collection* of *Matter*, by that they are able to overcome those *Natural inclinations* to the *Contrary*. And therefore in *Diseases* of that kind, let the *Physitian* apply himself more to *Purgation*, than to *Alteration*; because the offence is in the *Quantity*; and the *Qualities* are rectified of themselves.

Experiment
Solitary touch-
ing Cure of
Diseases which
are contrary to
Predisposition.

64

Experiments
Solitary, touch-
ing Preparations
before
Purging, and
settling of the
Body after-
ward.

65

Physicians do wisely prescribe, that there be *Preparatives* used before *Just Purgations*; For certain it is, that *Purgers* do many times great Hurt, if the Body be not accommodated, both before, and after the *Purging*. The Hurt that they do, for want of *Preparation* before *Purging*, is by the sticking of the Humours, and their not coming fair away; which causeth in the Body great Perturbations, and ill Accidents, during the *Purging*; And also the diminishing, and dulling of the Working of the *Medicine* it selfe that it purgeth not sufficiently; Therefore the work of *Preparation* is double; to make the Humours *slide*, and mature; and to make the *Passages* more open: For those both help to make the Humours passe readily. And for the former of these, *Syrups* are most profitable; And for the Latter *Apozumes*, or *Preparing broths*; *Clysters* also help lest the *Medicine* stop in the Guts, and work gripingly. But it is true, that *bodies abounding* with Humours; and fat Bodies; And open Weather; are *Preparatives* in themselves; because they make the Humours more fluid. But let a *Phytian* beware, how he purge after hard *Frosty Weather*, and in a *Leane Body*, without *Preparation*. For the Hurt, that they may do after *Purging*; It is caused by the *Lodging* of some Humours in ill Places: For it is certain, that there be Humours, which somewhere placed in the Body, are quiet, and do little hurt; in other Places, (especially *Passages*) do much mischief, Therefore it is good, after *Purging*, to use *Apozumes* and *Broth*, not so much *Opening* as those used before *Purging*, but *Abstusive* and *Mundifying Clysters* also are good to conclude with, to dray away the reliques of the Humours that may have descended to the *Lower Region* of the Body.

Experiment
Solitary, touch-
ing Stanch-
ing of Blood.

66

Blood is stanch'd divers wayes: First by *Astringents*, and *Repercussive Medicines*. Secondly, by *Drawing* of the Spirits and Blood inwards; which is done by cold; as *Iron* or a *Stone* laid to the Neck doth stanch the Bleeding of the Nose; also it hath been tried, that the *Testicles* being put into sharp vinegar, hath made a sudden *Recess* of the Spirits, and stanch'd Blood. Thirdly, by the *Recess* of the Blood by *Sympathy*, So it hath been tried that the part that bleedeth being thrust into the Body of a Capon, Sheep, new ript and bleeding hath stanch'd Blood; The Blood, as it seemeth, sucking and drawing up, by similitude of substance, The Blood it meeteth, with, and so it selfe going back. Fourthly, by *Custom* and *Time*; So the Prince of *Aurange*, in his first hurt by the *Spanish Boy*, could finde no means to stanch the Blood, either by *Medicine* or *Ligament*; but was fain to have the *Orifice* of the Wound stopped by *Mens Thumbs*, succeeding one another, for the space at the least of two Dayes; and at the last the blood by *Custom* onely retired. Their is a fifth way also in use, to let Blood in an *Adverse Part*, for a *Revulsion*.

Experiment
Solitary touch-
ing Change
of Aliments
and Medicines.

67

It helpeth, both in *Medicine* and *Aliment*, to Change and not to continue the same *Medicine* and *Aliment* still. The Cause is, for that Nature by continual Use of any Thing, groweth to a *Satiety* and *Dulnesse*, either of *Appetite*, or *Working*. And we see that *Assuetude* of Things Hurtfull doth make them lesse their force to hurt; As *Poyson*, which with use some have brought themselves to brook. And therefore it is no marvell, though things helpfull, by *Custom*, lesse their force to help; I count *intermission* almost the same thing with *Changes*. For that, that hath been intermitted, is after a sort new.

IT is found by Experience, that in *Diets of Guaiacum, Sarza,* and the like, (especially if they be strict) the *Patient* is more troubled in the beginning than after continuance; which hath made some of the more delicate Sort of *Patients*, give them over in the midst; Supposing, that if those *Diets* trouble them so much at first, they shall not be able to endure them to the End. But the cause is, for that all those *Diets*, to drie up *Humours, Rheums,* and the like; and they cannot dry up untill they have first attenuated; And while the *Humour* is attenuated, it is more Fluid, than it was before, and troubleth the Body a great deal more, untill it be dried up, and consumed. And therefore *Patients* must expect a due time, and not check at them at the first.

Experiment
Solitary, touch-
ing *Diets*,
68

THE Producing of Cold is a thing very worthy the Inquisition; both for Use and Disclosure of Causes. For *Heat* and *Cold* are *Natures* two hands, whereby she chiefly worketh: And *Heat* we have in readinesse, in respect of the *Fire*: But for *Cold* we must stay till it cometh; or seek it in deep Caves or high Mountaines: And when all is done, we cannot obtain it in any great degree: For *Furnaces of Fire* are farre hotter, than a *Summers Sun*, But *Vaults* or *Hills* are not much Colder than a *Winters Frost*.

Experiments
in Confort
touching the
Production of
Cold.

The First Meanes of Producing Cold is that which Nature presenteth us withall; Namely, the Expiring of Cold out of the Inward Parts of the Earth in *Winter*, when the Sun hath no power to overcome it; the Earth being (as hath been noted by some) (*Primum Frigidum*.) This hath been asserted, as well by Ancient, as by Modern Philosophers: It was the Tenet of *Parmenides*. It was the opinion of the Author of the discourse in *Plutarch*, (for I take it, that book was not *Plutarchs* own) *De primo Frigido*. It was the opinion of *Teleseus*, who hath renewed the Philosophy of *Parmenides*, and is the best of the *Novelists*.

69

The second Cause of Cold is the Contact of Cold Bodies; For Cold is Active and Transitive into Bodies Adjacent, as well as Heat: which is seen in those things that are touched with Snow or Cold water. And therefore, who-soever will be an Enquirer into Nature, let him resort to a Conservatory of Snow and Ice; Such as they use of delicacy, to cool Wine in Summer: Which is a Poor and Contemptible use, in respect of other uses, that may be made of such Conservatories.

70

The third Cause is the Primary Nature of all Tangible Bodies; For it is well to be noted, that all Things whatsoever (Tangible are of themselves Cold; except they have an Accessory Heat by Fire, Life, or Motion: For even the Spirit of Wine, or Chymicall Oyles, which are so hot in Operation, are to the first Touch, Cold; And Air it selfe compressed, and Condensed a little by blowing, is Cold.

71

The Fourth Cause is the Density of the Body; for all Dense Bodies are Colder than most other Bodies; as Metals, Stone, Glasses; and they are longer in Heating than Softer Bodies. And it is certain, that Earth, Dense, Tangible, hold all of the Nature of Cold. The cause is, for that all Matters Tangible being Cold, it must needs follow, that where the Matter is most Congregate the Cold is the greater.

72

The

73

The Fifth Cause of Cold or rather of encrease and vehemency of Cold, is a *Quick Spirit enclosed in a cold Body* : As will appear to any that shall attentively consider of Nature in many instances. We see Nitre (which hath a *Quick Spirit*) is Cold ; more Cold to the Tongue than a Stone ; So Water is Colder than Oil, because it hath a *Quicker Spirit* ; For all Oil, though it hath the Tangible parts better digested than Water, yet hath it a duller Spirit : So Snow is Colder than Water, because it hath more Spirit within it : So we see that Salt put to Ice (as in the producing of the *Artificial Ice*) encreaseth the Activity of Cold : So some Insects which have Spirit of Life, as Snakes and Silkwormes, are to the touch, cold. So Quick-silver is the Coldest of Metals because it is fullest of Spirit.

74

The Sixth Cause of Cold is the Chasing and Driving away of Spirits, such as have some Degree of Heat : For the Banishing of the Heat must needs leave any Body Cold. This we see in the operation of Opium, and Stupefactive upon the Spirits of living Creatures : And it were not amiss to trie Opium by laying it upon the Top of a Weather-glass, to see whether it will contract the Air : But I doubt it will not succeed : For besides that the vertue of Opium will hardly penetrate thorow such a body as Glass, I conceive that Opium, and the like, make the Spirits fly rather by Malignity, than by Cold.

75

Seventhly, the same Effect must follow upon the Exhaling or Drawing out of the warm Spirits, that doth upon the flight of the Spirits. There is an Opinion, that the Moon is Magneticall of Heat, as the Sun is of Cold and Moisture : It were not amiss therefore to trie it, with Warm-waters : The one exposed to the Beames of the Moon ; the other with some Skreen betwixt the Beams of the Moon and the Water ; As we use to the Sun for Shade ; and to see whether the former will cool sooner. And it were also good to enquire, what other meanes there may be, to dray forth the Exile heat which is in the Air ; for that may be a secret of great Power to Produce Cold Weather.

Experiments
in Consort
touching the
Version, and
Transmutation
of Air into
Water.

WE have formerly set down the Meanes of turning air into Water, in the Experiment 27. But because it is *Magnale Nature* ; and tendeth to the subduing of a very great effect ; And is also of manifold use ; we will adde some instances in Consort that give light thereunto.

76

It is reported by some of the Ancients, that Sailors have used, every Night, to hang Fleeces of Wool on the sides of their Ships, the Wool towards the Water ; And that they have crushed fresh Water out of them, in the Morning, for their use. And thus much we have tried, that a Quantity of Wool tied loose together, being let down into a deep Well ; And hanging in the Middle, some three Fathome from the Water, for a night, in the Winter time ; increased in weight, (as I now remember) to a fifth Part.

77

It is reported by one of the Ancients, that in Lydia neer Pergamus, there were certain Work-men, in time of wars fled into Caves ; And the Mouth of the Caves being stopped by the Enemies, they were famished. But long time after the dead Bodies were found ; and some Vessels which they had carried with them ; and the Vessels full of water ; and that Water, thicker, and more towards Ice, than Common Water : which is a Notable Instance of Condensation and Induration by Burial under Earth, (in Caves) for long time ; And of version also (as it should seem) of Air into Water ;

if

it any of those vessels were Empty. Try therefore a small Bladder hung in Snow; and the like in Nitre; and the like in Quick-silver: And if you find the Bladders fallen, or shrunk; you may be sure the Air is condensed by the Cold of those Bodies; As it would be in a Cave under Earth.

It is reported of very good credit, that in the East-Indies if you set a Tub of Water open in a Room where Cloves are kept, it will be drawn dry in 24 houres; Though it stand at some distant from the Cloves. In the Country, they use many times, in deceit, when their Wooll is new shorn, to set some Pailles of Water by in the same Room; to encrease the weight of the Wooll. But it may be that the Heat of the Wooll remaining from the body of the Sheep; or the Heat gathered by the lying close of the Wooll, helpeth to dray the watry vapour; But that is nothing to the Version.

It is reported also credibly, that Wool new shorn, being laid casuall upon a Vessel of Verjuice, after some time hath drunk up a great part of the Verjuice, though the Vessel were whole without any Flaw, and had not the Bung-hole open. In this Instance there is (upon the by) to be noted, the Percolation, or Suing of the Verjuice thorow the wood; For Verjuice of it selfe would never have passed through the wood: So, as it seemeth, it must be first in a Kind of Vapour before it passe.

It is especially to be noted, that the Cause, that doth facilitate the Version of Air into Water, when the Air is not in gross, but subtilly mingled, with Tangible Bodies, is, (as hath been partly touched before) for that Tangible Bodies have an Antipathy with Air; and if they find any Liquid Body, that is more dense, near them, they wil draw it: And after they have drawn it, they will condense it more, and in effect incorporate it; for we see that a Spunge, or Wooll, or Sugar, or a Woollen-cloth, being put but in part, in Water, or Wine, will draw the Liquor higher, and beyond the place: where the Water or Wine cometh. We see also that Wood, Lute-strings and the like, do swel in moist Seasons: As appeareth by the Breaking of the Strings, the Hard Turning of the Pegs, and the Hard drawing forth of Boxes, and Opening of Wainscot doores; which is a kind of Infusion: And is much like to an Infusion in Water, which will make Wood to Swel: As we see in the filling of the Chops of Bowles by laying them in Water. But for that part of these Experiments, which concerneth Attraction we will reserve it to the proper Title of Attraction.

There is also a Version of Air into Water, seing in the Sweating of Marbles, and other Stones. And of Wainscot before and in moist weather: This must be, either by some Moisture the Body yieldeth; Or else by the Moist Air thickned against the hard body. But it is plain, that it is the latter; For that we see Wood painted with Oil Colour, will sooner gather drops in a moist Night, than Wood alone: which is caused by the Smoothnesse and Closeness; which letteth in no part of the vapour, and so turneth it back, and thickeneth it into Dew. We see also, that Breathing upon a Glasse, or Smooth body giveth a Dew; And in Frosty Mornings (such as we call Rime frosts) you shall finde drops of Dew upon the Inside of Glasse-windowes; And the Frost it self upon the ground, is but a Version, or Condensation, of the Moist vapours of the night, into a watry substance: Dewes likewise, and Rain, are but the returns of Moist vapours condensed; The Dew, by the Cold onely of the Suns departure, which is the gentler Cold; Raines, by the Cold of that which they call the Middle Region of the Air; which is the more violent Cold.

It is very probable (as hath been touched) that that, which will turn

Water

Water into Ice, will likewise turn Air some Degree nearer unto Water. Therefore trie the Experiment of the Artificiall Turning Water into Ice (whereof we shall speak in another place) with Air in place of Water, and the Ice about it. And although it be a greater Alteration to turn Air into Water, than Water into Ice: Yet there is this Hope, that by continuing the Air longer time, the effect will follow; For that Artificial Conversion of Water into Ice, is the work of a few houres; And this of Air may be tried by a Moneths space, or the like.

Experiments
in Confort
touching Indu-
ration of Bodies

Induration, or Lapidification, of Substances more soft, is likewise another degree of Condensation; and is a great Alteration in Nature. The Effecting and Accelerating thereof is very worthy to be enquired it is effected by three Meanes. The first is by Cold; whose property is to Condense, and constipate, as hath been said. The second is by Heat; which is not proper but by consequence; For the Heat doth attenuate, and by Attenuation doth send forth the Spirit and moister Part of a Body; And upon that, the more grosse of the Tangible Parts do contract and serve themselves together; Both to avoid Vacuum (as they call it) And also to Munite themselves against the Force of the Fire, which they have suffered. And the third is by Assimilation, when a hard Body Assimilateth a Soft, being contiguous to it.

The Examples of Induration taking them promiscuously, are many: As the Generation of Stones within the Earth, which at the first are but Rude Earth, or Clay: And so of Minerals, which come (no doubt) at first of Juyces Concrete, which afterward indurate: And so of Porcellane, which is an Artificial Cement, buried in the Earth a long time: and so the Making of Brick, and Tile: Also the Making of Glass, of a certain Sand, and Brake-Roots and some other Matters: Also the Exudations of Rock Diamonds, and Chryshall, which harden with time: Also the Induration of Bead-Amber, which at first is a soft Substance; as appeareth by the Flies, and Spiders, which are found in it; and many more. But we will speak of them distinctly.

83

For Indurations by Cold, there be few Trials of it; For we have no strong or intense Cold here on the Surface of the Earth, so near the Beames of the Sun and the Heavens. the likeliest Trial is by Snow, and Ice; for as Snow and Ice especially being holpen, and their Cold activated by Nitre, or Salt, will turn Water into Ice, and that in a few houres; So it may be it will turn Wood or Stiff Clay, into Stone, in longer time. Put therefore, into a Conseruing Pit of Snow and Ice, (adding some quantity of Salt and Nitre) a Piece of Wood, or a Piece of Tough Clay, and let it ly a month or more.

84

Another trial is by Metalline Waters, which have virtual Cold in them.

Put

Put therefore *Wood*, or *Clay*, into *Smiths water*, or other *Metalline waters*, and try whether it will not harden in some reasonable time. But I understand it, of *Metalline waters*, that come by *Washing*, or *Quenching*, and not of *Strong Waters* that come by dissolution; for they are too *Corrosive* to consolidate.

It is already found, that there are some *Naturall Spring-waters*, that will *Inlapidate Wood*; So as you shall see one piece of *Wood*, whereof the Part above the *Water* shall continue *Wood*; and the Part under the *Water* shall be turned into a kind of *Gravelly Stone*. It is likely those *Waters* are of some *Metalline Mixture*; But there would be more particular Inquiry made of them. It is certain, that an *Egge* was found, having lain many years in the bottom of a *Moat*, where the *Earth* had somewhat overgrown it: And this *Egge* was come to the *Hardnesse* of a *Stone*; and had the *Colours* of the *White* and *Yolk* perfect: And the shell shining in small graines like *Sugar*, or *Alablaster*.

Another Experience there is of *Induration* by *Cold*, which is already found; which is, that *Metalls* themselves are hardened by often *Heating*, and *Quenching* in *Cold water*: For *Cold* ever worketh most potently upon *Heat* precedent.

For *Induration* by *Heat*, it must be considered, that *Heat*, by the Exhaling of the *Moister Parts*, doth either harden the *Body*; as in *Bricks*, *Tiles*, &c. Or if the *Heat* be more fierce, maketh the grosser Part it self, run and melt; as in the making of ordinary *Glass*, and in the *Vitrification* of *Earth*, (as we see in the *Inner Parts* of *Fornaces*) and in the *Vitrification* of *Erick*, and of *Metals*. And in the former of these, which is the *Hardening* by *baking*, without *Melting*, the *Heat* hath these degrees; First, it *Induratheth*, and then maketh *Fragile*, and lastly, it doth *Incinerate*, and *Calcinateth*.

But if you desire to make an *Induration* with *Toughness*, and less *Fragility*; a middle way would be taken; Which is that which *Aristotle* hath well noted; but would be thoroughly verified. It is, to decoct *Bodies* in *Water*, for two or three days; But they must be such *bodies*, into which the *Water* will not enter; as *Stone*, and *Metall*. For if they be *Bodies* into which the *Water* will enter, then long *Seething* will rather *Softens* than *Indurate* them; as hath been tried in *Eggs*, &c. Therefore, *Softer Bodies* must be put into *Bottles*, and the *Bottles* hung into *Water* seething, with the *mouths open*, above the *Water*: that no *Water* may get in; For by this *Means*, the *virtuall Heat* of the *Water* will enter; and such a *Heat*, as will not make the *Body* adust, or *fragile*; But the *Substance* of the *Water* will be shut out. This *Experiment* we made; and it sorted thus; It was tried with a piece of *Free-stone*, and with *Pewter*, put into the *Water* at large; the *Free-stone* we found received in some *Water*; for it was softer and easier to scrape, than a piece of the same *Stone* kept drie. But the *Pewter*, into which no *water* could enter, became more *white*, and liker to *Silver*, and less *flexible*, by much. There were also put into an earthen *Bottle*, placed as before, a good *Pellet of Clay*, a piece of *Cheese*, a piece of *Chalk*, and a piece of *Free-stone*. The *Clay* came forth almost of the hardness of *Stone*; The *Cheese* likewise very hard, and not well to be cut: The *Chalk* and the *Free-stone* much harder then they were. The colour of the *Clay* inclined not a whit to the colour of *Brick*, but rather to *white*, as in ordinary drying by the *Sun*. Note, that all the former trials were made by a *Boyling* upon a good hot *Fire*, renewing the *Water* as it consumed, with other hot *Water*; but the *boyling* was

was but for twelve hours only; And it is like that the Experiment would have been more effectually, if the boiling had been for two or three days, as we prescribed before.

89

As touching *Assimilation*, (for there is a degree of *Assimilation* even in Inanimate bodies) we see Examples of it in some *Stones*, in *Clay-Grounds*, lying near to the top of the Earth, where *Pebble* is; In which you may manifestly see divers *Pebbles* gathered together, and a Crust of *Cement* or *Stone*, between them, as hard as the *Pebbles* themselves: And it were good to make a triall of purpose, by taking *Clay*, and putting in it divers *Pebble Stones*, thick set, to see whether in continuance of time, it will not be harder than other *Clay* of the same lump, in which no *Pebbles* are set. We see also in Ruins of old Walls, especially towards the bottome, the *Mortar* will become as hard as the *Brick*; We see also, that the *Wood* on the sides of *Vessels* of *Wine*, gathereth a crust of *Tartar* harder than the *Wood* it self; And *Scales* likewise grow to the *Teeth*, harder than the *Teeth* themselves.

90

Most of all, *Induration* by *Assimilation* appeareth in the bodies of *Trees*, and *living Creatures*: For no Nourishment, that the *Tree* receiveth, or that the *living Creature* receiveth, is so hard as *Wood*, *Bone*, or *Horn*, &c. but is *Indurated* after by *Assimilation*.

Experiment
Solitary, touch-
ing the Ver-
sion of Water
into Air.

91

THe eye of the Understanding, is like the eye of the Sense: For as you may see great Objects through small Crannies, or Levels: So you may see great *Axiomes* of Nature, through small and Contemptible *Instances*. The Speedy Depredation of Air upon watry *Moisture*, and *Version* of the same into Air, appeareth in nothing more visible, than in the sudden Discharge, or vanishing, of a little *Cloud* of *Breath*, or *Vapour*, from *Glass*, or the *Blade* of a *Sword*, or any such Polished Body; Such as doth not at all Detain, or Imbibe the *Moisture*; For the *Mistiness* scattereth and breaketh up suddenly: But the like *Cloud*, if it were *Oily*, or *Fatty*, will not discharge; not because it sticketh faster; But because Air preyeth upon *Water*; and *Flame*, and *Fire*, upon *Oil*; And therefore, to take out a Spot of Grease, they use a *Coal* upon brown Paper; Because *Fire* worketh upon Grease or *Oil*, as Air doth upon *Water*. And we see Paper oiled, or Wood oiled, or the like, last long moist; but wet with *Water*, drie, or putrifie sooner. The cause is, for that Air medleth little with the *Moisture* of Oil.

Experiment
Solitary, touch-
ing the Force
of Union.

92

THere is an Admirable demonstration, in the same trifling Instance, of the little *Cloud* upon *Glass*, or *Gemmes*, or *Blades* of *Swords*, of the Force of Union, even in the least Quantities, and weakest Bodies, how much it conduceth to preservation of the present Forme; And the resisting of a new. For mark well the discharge of that *Cloud*, and you shall see it ever break up, first in the Skirts, and last in the Midst. We see likewise, that much *Water*, draweth forth the Iuyce of the Body Infused; but little *water*, is imbibed by the Body: And this is a Principall Cause, why, in Operation upon Bodies, for their *Version* or *Alteration*, the triall in great Quantities, doth not answer the triall in small; and so deceiveth many; for that (I say) the greater Body, resisteth more any *Alteration* of Forme, and requireth farre greater strength in the Active Body, that should subdue it.

Experiment
Solitary, touch-
ing the Pro-
ducing of Fea-
thers and Hairs
of divers Co-
lours.

93

WE have spoken before, in the fifth Instance, of the Cause of *Orient Colours*, in *Birds*; Which is by the Fineness of the Strainer; we will now endeavour to reduce the same *Axiome* to a Work. For this Writ-
ing

ting of our *Sylva Sylvarum*, is (to speak properly) not *Natural History*, but a high kind of *Natural Magick*. For it is not a Description onely of Nature, but a breaking of Nature, into great and strange Works. Try therefore, the Anointing over of *Pigeons*, or other *Birds*, when they are but in their Down; Or of *Whelps*, cutting their Hair as short as may be: Or of some other Beast; with some Oyntment, that is not hurtfull to the flesh; and that will harden, and stick very close; and see whether it will not alter the Colours of the *Feathers*, or *Hair*. It is received, that the Pulling off, the first *Feathers* of *Birds* clean, will make the new come forth *White*: And it is certain, that *White* is a penurious Colour: and where moisture is scant. So *Blew Violets*, and other *Flowers*, if they be starved, turn *Pale* and *White*: *Birds*, and *Horses*, by Age or Scars, turn *White*: and the *Hoare Haires* of Men, come by the same reason. And therefore in *Birds*, it is very likely, that the *Feathers*, that come first, will be many times of divers Colours, according to the Nature of the *Bird*; For that the Skin is more porous; But when the Skin is more shut and close, the *Feathers* will come *White*. This is a good *Experiment* not only for the Producing of *Birds* and *Beasts* of strange Colours; but also, for the disclosure of the Nature of Colours themselves; which of them require a finer Porosity, and which a grosser.

IT is a work of Providence, that hath been truly observed by some; That the *Tolk* of the *EGGE*, conduceth little to the *Generation* of the *Bird*, but only to the *Nourishment* of the same: For if a *Chicken* be opened, when it is new hatched, you shall find much of the *Tolk* remaining. And it is needfull, that *Birds*, that are shaped without the *Females Womb*, have in the *EGGE*, as well Matter of *Nourishment*, as Matter of generation for the Body. For after the *EGGE* is laid, and severed from the Body of the *Hen*, It hath no more *Nourishment* from the *Hen*; but only a quickning Heat when she sitteth. But *Beasts*, and Men need not the matter of *Nourishment* within themselves; because they are shaped within the *Womb* of the *Female*, and are *Nourished* continually from her Body.

Experiments
Solitary touch-
ing the Nourish-
ment of Living
Creatures
before they be
brought forth.

94

IT is an inveterate and received Opinion, that *Cantharides* applyed to any Part of the Body, touch the *Bladder*, and exulcerate it, if they stay on long. It is likewise Received, that a kind of *Stone*, which they bring out of the *West Indies*, hath a peculiar force to move *Gravell*, and to dissolve the *Stones*, insomuch as laid but to the *Wrest*, it hath so forcibly sent down *Gravell*, as Men have been glad to remove it; it was so violent.

Experiments
in Confort
touching Sym-
paty and An-
tipaty for Me-
dicinall use.

95

It is received and confirmed by daily Experience, that the *Soales* of the *Feet* have great Affinity with the *Head*, and the *Mouth* of the *Stomach*: As we see, *Going wet-shod*, to those that use it not, affecteth both: Applications of *hot Pouders* to the *Feet* attenuate first, and after dry the *Rhenme*: And therefore a *Physitian*, that would be *Mysticall*, prescribeth, for the Cure of the *Rhenme*, that a Man should walk continually upon a *Camomill-alley*; meaning, that he should put *Camomill* within his *Socks*. Likewise *Pigeons* bleeding; applyed to the *Soales* of the *Feet*, ease the *Head*: And *Soporiferous Medicines* applyed unto them, provoke *sleep*.

96

It seemeth, that as the *Feet* have a *Sympathy* with the *Head*; so the *Wrests* and *Hands*, have a *Sympathy* with the *Heart*: We see the *Affects* and *Passions* of the *Heart*, and *Spirits*, are notably disclosed by the *Pulse*: And it is often tryed, that *Juyces* of *Stock-gilly-flowers*, *Rose-campion*, *Garlick*, and other things; applyed to the *Wrests*, and renewed; have cured long *Agues*.

97

And I conceive, that washing, with certain *Liquours*, the *Palms* of the *Hands*, doth much good: And they do well in *Heats* of *Agnes*, to hold in the *Hands*, *Eggs* of *Alabaster*, and *Balls* of *Cryſtall*.

Of theſe things we ſhall ſpeak more, when we handle the Title of Sympathy and Antipathy, in the proper place.

Experiment
Solitary touch-
ing the ſe-
cret Proceſſes of
Nature.

89

THe knowledge of man(hitherto) hath been determined by the View, or Sight; So that whatſoever is Inviſible, either in reſpect of the *Fineneſs* of the *Body* it ſelf; or the *ſmalneſs* of the *Parts*; or of the *ſubtilty* of the *Motion*; is little inquired. And yet theſe be the things that Govern Nature principally, and without which, you cannot make any true *Analysis* and *Indications* of the proceedings of Nature. The *Spirits* or *Pneumatics*, that are in all *Tangible Bodies*, are ſcarce known. Sometimes they take them for *Vacuum*; whereas they are the moſt Active of *Bodies*. Sometimes they take them for *Air*; From which they differ exceedingly, as much as *Wine* from *Water*; and as *Wood* from *Earth*. Sometimes they will have them to be *Natural Heat*, or a *Portion* of the *Element of Fire*; Whereas ſome of them are crude, and cold. And ſometimes they will have them to be the *Vertues* and *Qualities* of the *Tangible Parts*, which they ſee; whereas they are things by themſelves. And then, when they come to *Plants* and *living Creatures*, they call them *ſouls*. And ſuch Superficall Speculations they have; Like *Proſpectives*, that ſhew things inward, when they are but *Paintings*. Neither is this a *Queſtion* of *Words*, but infinitely materiall in *Nature*. For *Spirits* are nothing elſe but a *Natural Body*, rarified to a *Proportion*, and included in the *Tangible Parts* of *Bodies*, as in an *Integument*. And they be no leſs differing one from the other, than the *Denſe* or *Tangible Parts*: And they are in all *Tangible Bodies* whatſoever, more or leſs; and they are never (almoſt) at reſt: And from them, and their *Motions*, principally proceed *Arefaction*, *Colliquation*, *Concoction*, *Maturation*, *Putrefaction*, *Vivification*, and moſt of the effects of Nature: For, as we have figured them in our *Sapientiâ Veterum*, in the *Fable of Proſerpina*, you ſhall in the *Infernal Regiment* hear little doings of *Pluto*, but moſt of *Proſerpina*: For *Tangible Parts* in *Bodies* are *Stupid* things; and the *Spirits* do (in effect) all. As for the differences of *Tangible Parts* in *Bodies*, the *industry* of the *Chymiſts* hath given ſome light, in diſcerning by their *Separations*, the *Oily*, *Crude*, *pure*, *Impure*, *Fine*, *Groſs*, *Parts* of *Bodies*, and the like. And the *Phyſitians* are content to acknowledge that *Herbs* and *Drugs* have divers *Parts*; As that *Opium* hath a *Stupeſacting Part*, and a *Heating Part*; The one moving *Sleep*, the other a *Sweet following*; and that *Rubarb* hath *Purging Parts*, and *Aſtringent Parts*, &c. But this whole *Inquiſition* is weakly and *Negligently* handled. And for the more ſubtill differences of the *Minute Parts*, and the poſture of them in the *Body*, (which alſo hath great *Effects*): they are not at all touched: As for the *Motions* of the *Minute Parts* of *Bodies*, which do ſo great *Effects*, they have not been obſerved at all; becauſe they are *Inviſible*, and incur not to the eye; but yet they are to be deprehended by *Experience*: As *Democritus* ſaid well, when they charged him to hold, that the *World* was made of ſuch little *Moats*, as were ſeen in the *Sun*; *Atomus* (ſaith he) *neceſſitate Rationis & Experientie eſſe convincitur; Atomum enim nemo nunquam vidit*. And therefore the *Tumult* in the *Parts* of *Solid Bodies*, when they are compressed, which is the *Cauſe* of all *Flight* of *Bodies* thorow the *Air*, and of other *Mechanicall Motions*, (as hath been partly touched before, and ſhall be thoroughly handled in due place,) is not ſeen

at

at all but never thelesse if you know it not, or enquire it not attentively and dilligently you shall never be able to discern, and much lesse to produce, a Number of *Mechanicall Motions*. Again, as to the *Motions Corporall*, within the Enclosures of Bodies, whereby the effects, (which were mentioned before) passe between the *Spirits*, and the *Tangible Parts* (which are *Arefaction*, *Colliquation*, *Concoction*, *Maturation*, &c.) they are not at all handled. But they are put off by the names of *Vertues*, and *Natures*, and *Actions*, and *Passions*, and such other *Logicall Words*.

IT is certain, that of all *Powers in Nature*, *Heat* is the chief; both in the *Frame of Nature*, and in the works of *Art*. Certain it is likewise, that the *Effects of Heat*, are most advanced, when it worketh upon a *Body*, without loss or dissipation of the *Matter*; For that ever betrayed the Account. And therefore it is true that the power of *Heat* is best perceived in *Distillations*, which are performed in close *Vessels*, and *Receptacles*. But yet there is a higher Degree; For howsoever *Distillations* do keep the *Body* in *Cells*, and *Cloysters* without going a broad, yet they give space unto *Bodies* to turn into *Vapour*; To return into *Liquor*; and to seperate one part from another. So as *Nature* doth expatiate, although it hath not full *Liberty*: Whereby the true and *Ultime Operations of Heat* are not attained. But if *Bodies* may be altered by *Heat*, and yet no such *Reciprocation of Rarefaction*, and of *Condensation*, and of *Seperation*, admitted; then it is like that this *Proteus of Matter*, being held by the sleeves, will turn and change into many *Metamorphoses*. Take therefore a *square Vessel of Iron*, in form of a *Cube*, and let it have good thick and strong sides. Put it into a *Cube of Wood*, that may fill it as close as may be; and let it have a *Cover of Iron* as strong, (at least) as the sides; and let it be well *Luted*, after the manner of the *Chymists*. Then place the *Vessel* within burning *Coals* kept quick kindled, for some few hours space. Then take the *Vessel* from the *Fire*, and take off the *Cover* and see what is become of the *Wood*, I conceive that since all *Inflammation*, and *Evaporation* are utterly prohibited, and the *Body* still turned upon it selfe, that one of these two *Effects* will follow; Either that the *Body of the Wood* will be turned into a kind of *Amalgama*, (as the *Chymists* call it;) or that the finer part will be turned into *Air*, and the *Grosser* stick as it were baked, and incrustate upon the sides of the *Vessel*, being become of a *Denser Matter*, than the *Wood* it self, *Crude*. And for another *Trial*, take also *Water*, and put it in the like *Vessell* stoped as before; But use a gentler *Heat* and remove the *Vessell* sometimes from the *Fire*; and again after some small time, when it is cold renew the *Heating of it*: and repeat this *Alteration* some few times: and if you can once bring to passe, that the *Water*, which is one of the simplest of *Bodies*, be changed in *Colour*, *Odour*, or *Taste*, after the manner of *Compound Bodies*, you may be sure that there is a great *Work* wrought in *Nature*, and a *Notable Entrance* made in strange *Changes of Bodies*, and productions: And also a *Way* made to do that by *Fire*, in small time, which the *Sunne* and *Age* do in long time. But of the admirable effects of this *Distillation in Close*, (for so we call it) which is like the *Wombs* and *Matrices* of living creatures, where nothing *Expireth* nor *Seperateth*; We will speak fully, in the due place; Not that we aime at the making of *Peracelsus Pigmeys*; or any such *Prodigious Follies*; But that we know the *Effects of Heat* will be such, as will scarce fall under the *Conceit of Man*; If the force of it be altogether kept in.

Experiment
Solitary rouching the
Power of Heat.

99

Experiment
Solitary, touch-
ing the Im-
possibility of
Annihilation.

100

THere is nothing more Certain in Nature, than that it is impossible for any *Body* to be utterly *Annihilated*; But that as it was the work of the Omnipotency of *God*, to make *Somewhat* of *Nothing*; So it requireth the like Omnipotency, to turn *Somewhat* into *Nothing*. And therefore it is well said by an obscure Writer of the *Sect* of the *Chymists*; that there is no such way, to effect the strange *Transmutations* of *Bodies*, as to endeavour and urge by all meanes the *Reducing* of them to *Nothing*. And herein is contained also a great Secret of *Preservation* of *Bodies* from *Change*; For if you can prohibite, that they neither turne into *Air*, because no *Air* cometh to them; Nor go into the *Bodies* *Adjacent*, because they are utterly *Heterogeneous*; nor make a *Round* and *Circulation* within themselves; they will never change though they be in their Nature never so *Perishable*, or *Mutable*. We see how *Flies* and *Spiders*, and the like, get a *Sepulchre* in *Amber*, more durable than the *Monument* and *Embalming* of the *Body* of any *King*. And I conceive the like will be of *Bodies* put into *Quick-silver*. But then they must be but thin; as a leaf or a peece of *Paper*, or *Parchment*; For if they have a greater *Cassitude*, they will alter in their own *Body* though they spend not. But of this we shall speak more when we handle the *Title* of *Conservation* of *Bodies*,

NATURAL



NATURAL HISTORY.

II. Century



Musick in the *Practice*, hath been well pursued : And in good variety : but in the *Theory*, and especially in the *Yielding* of the *Causes* of the *Practice*, very weakly : being reduced into certain Mysticall Subtilties, and not much Truth. We shall therefore, after our manner, joyn the *Contemplative* and *Active* Part together.

Experiments
in Confort
touching
Musick.

101

All Sounds are either *Musicall Sounds*, which we call *Tones* ; Whereunto there may be an *Harmony* ; which Sounds are ever *Equall* ; As *Singing*, the Sounds of *Stringed*, and *Wind-Instruments*, the *Ring*ing of *Bells*, &c. Or *Immusicall Sounds* ; which are ever *Unequall* ; Such as are the *Voice* in *speaking*, all *Whisperings*, all *Voices* of *Beasts*, and *Birds*, (except they be *Singing Birds*,) all *Percussions*, of *Stones*, *Wood*, *Parchment*, *Skins*, (as in *Drums*) and infinite others.

102

The Sounds that produce *Tones*, are ever from such *Bodies*, as are in their *Parts* and *Pores* *Equall* ; as well as the Sounds themselves are *Equall* ; And such are the *Percussions* of *Metall*, as in *Bells* ; Of *Glasse*, as in the *Fillipping* of a *Drinking Glas*se ; of *Air*, as in *Mens Voices* whilst they *Sing*, in *Pipes*, *Whistles*, *Organs*, *Stringed Instruments*, &c. And of *Water*, as in the *Nightingale* *Pipes* of *Regalls*, or *Organs*, and other *Hydrauliks* ; which the *Ancients* had, and *Nero* did so much esteem, but are now lost. And if any *Man* think, that the *String* of the *Bow*, and the *String* of the *Vial*, are neither of them *Equall Bodies* ; And yet produce *Tones* ; he is in an error. For the Sound is not created between the *Bow* or *Plectrum* and the *String* ; But between the *String* and the *Aire* ; No more than it is between the *Finger* or *Quill*, and the *String* in other *Instruments*. So there are (in effect) but three *Percussions* that

creat Tones; Percussion of Metals, (comprehending Glasse and the like) Percussions of Air, and Percussions of Water.

103

The Diapason, or Eight in Musick is the sweetest Concord; inasmuch, as it is in effect an Unison; as we see in Lutes that are strung in the Base Strings with two strings, one an Eighth above another; which make but as one Sound and every Eighth Note in Ascent, (as from Eight to Fifteen, from Fifteen to Twenty two, and so in infinitum) are but Scales of Diapason. The Cause is dark, and hath not been rendred by any, and therefore would be better contemplated. It seemeth that Air, (which is the Subject of Sounds) in Sounds that are not Tones, (which are all unequal as hath been said) admitteth much Variety; As we see in the Voices of living Creatures; and likewise in the Voices of severall Men; (for we are capable to discern severall Men by their Voices) And in the Conjugation of Letters, whence Articulate Sounds proceed; which of all others are most various. But in the Sounds which we call Tones, (that are ever Equall) the Air is not able to cast it selfe into any such variety; But is forced to recurre into one an the same Posture or Figure, only differing in greatnesse and smalnesse. So we see Figures may be made of lines, Crooked and Straight, in infinite Variety, where there is Inequality; But Circles, or Squares, or Triangles Equilateral, (which are all Figures, of Equall lines) can differ but in Greater or Lesser.

104

It is to be noted (the rather lest any Man should think that there is any thing in this Number of Eight, to create the Diapason) that this Computation of Eight, is a thing rather received, than any true Computation. For a true Computation ought ever to be, by Distribution into equal Portions. Now there be intervenient in the Rise of Eight (in Tones) two Beemolls, or Halfe Notes; So as if you divide the Tones equally, the Eighth is but Seven whole and equall Notes; and if you subdivide that into Halfe-Notes, (as it is in the Stops of a Lute) it maketh the Number of Thirteen.

105

Yet this is true; That in the ordinary Rises and Falls of the Voice of Man (not measuring the Tone by whole Notes and Halfe Notes, which is the Equall Measure) there fall out to be two Beemolls (as hath been said) between the Unison and the Diapason: And this Varying is naturall. For if a Man would endeavour to raise or fall his Voice still by Halfe Notes, like the stops of a Lute; or by whole Notes alone, without Halfs, as farre as an Eighth; he will not be able to frame his Voice unto it, Which sheweth, that after every three whole notes Nature requireth, for all Harmonicall use, one Halfe Note to be interposed.

106

It is to be considered, that whatsoever vertue is in Numbers, for Conducing to Concord of Notes, is rather to be adscribed to the Ante-number, than to the Entire-number; As namely, that the Sound returneth after Six, or after Twelve; So that the Seventh or the Thirteenth is not the Matter, but the Sixth, or the Twelfth; And the Seventh and the Thirteenth are but the limits and Boundaries of the return.

107

The Concorde in Musick, which are Perfect, or Semiperfect, between the Unison and the Diapason, are the Fifth, which is the most Perfect; the Third next; and the Sixth which is more harsh: And as the Ancients esteemed, and so do my selfe and some Other yet, the Fourth which they call Diateseron, as for the Tenth, Twelfth, Thirteenth, and so in Infinitum; they be but Recurrences of the Former; viz. of the Third, the Fifth, and the Sixth; being an Eighth respectively from them.

108

For Discords the Second and the Seventh, are of all others the most odious in Harmony to the Sense; whereof the One is next above the Unison, the Other

ther next under the *Diapason* : which may shew, that *Harmony* requireth a competent distance of *Notes*

In *Harmony* if there be not a *Discord* to the *Base*, it doth not disturb the *Harmony*, though there be a *Discord* to the *Higher Parts*; So the *Discord* be not of the *Two* that are *Odious*; and therefore the ordinary *Concent* of *Four Parts* consisteth of an *Eighth*, a *Fifth*, and a *Third* to the *Base* : But that *Fifth* is a *Fourth* to the *Treble*, and the *Third* is a *Sixth*. And the *Cause* is, for that the *Base* striking more *Air*, doth overcome and drown the *Treble*, (unlessse the *Discord* be very *Odious*) and so hideth a small Imperfection. For we see, that in one of the *Lower strings* of a *Lute*, there soundeth not the *Sound* of the *Treble* nor Any *Mixt Sound*, but onely the *Sound* of the *Base*.

We have no *Musick* of *Quarter-Notes*, And it may be, they are not capable of *Harmony*; For we see the *Half-Notes* themselves do but interpose sometimes. Neverthelesse we have some *Slides* or *Relishes*, of the *Voice*, or *Strings* as it were continued without *Notes*, from one *Tone* to another, rising or falling which are delightful.

The *Causes* of that which is *Pleasing*, or *Ingrate* to the *Hearing*, may receive light by that, which is *Pleasing* or *Ingrate* to the *Sight*. There be two Things *Pleasing* to the sight (leaving *Pictures* and *Shapes* aside, which are but *Secondary Objects*; and please or displease but in *Memory*;) these two are *Colours*, and *Order*. The pleasing of *Colour* symbolizeth with the *Pleasing* of any *Single Tone* to the *Ear*; But the pleasing of *Order* doth symbolize with *Harmony*. And therefore we see in *Garden-knots*, and the *Frets* of *Houses*, and all equall and well answering *Figures*, (as *Globes*, *Pyramides*, *Cones*, *Cylinders*, &c.) how they please; whereas *unequall figures* are but *Deformities*. And both these pleasures, that of the *Eye*, and that of the *Ear*, are but the effects of *Equality*, *good Proportion*, or *Correspondence*: So that (out of *Question*) *Equality* and *Correspondence* are the *Causes* of *Harmony*. But to find the *Proportion* of that *Correspondence*, is more abstruse; whereof notwithstanding we shall speak somewhat, (when we handle *Tones*, in the generall Enquiry of *Sounds*).

Tones are not so apt altogether to procure *Sleep*, as some other *Sounds*; As the *Wind*, the *Purling* of *Water*, *Humming* of *Bees*, a *Sweet Voice* of one that readeth, &c. The *Cause* whereof is, for that *Tones*, because they are *Equall* and slide not, do more strike and erect the *Sense*, than the other. And *Overmuch Attention* hindreth *Sleep*.

There be in *Musick* certain *Figures* or *Tropes*; almost agreeing with the *Figures* of *Rhetorick*; and with the *Affections* of the *Mind*, and other *Senses* First, the *Division* and *Quavering*; which please so much in *Musick*, have an Agreement with the *Glittering* of *Light*; As the *Moon-Beames* playing upon a *Wave*. Again; the *Falling* from a *Discord* to a *Concord*, which maketh great *Sweetnesse* in *Musick*, hath an Agreement with the *Affections*, which are reintegrated to the better, after some dislikes: It agreeth also with the *Tast*, which is soon gluttied with that which is sweet alone. The *sliding* from the *Close* or *Cadence*, hath an Agreement with the *Figure* in *Rhetorick*, which they call *præter Expectatum*; for there is a pleasure even in being deceived. The *Reports* and *Fuges* have an Agreement with the *Figures* in *Rhetorick*, of *Repetition* and *Traduction*. The *Tripla's* and *Changing* of *Times*, have an Agreement with the *Changes* of *Motions*; As when *Galliard Time*, and *Measure Time*, are in the *Medly* of one *Dance*.

It hath been anciently held, and observed, that the *Sense* of *Hearing*, and the *Kinds* of *Musick*, have most Operation upon *Manners*; As to encourage Men,

Men and make them warlike ; to make them Soft and Effeminate ; To make them Grave ; To make them Light ; To make them gentle and inclin'd to pity, &c. The Cause is, for that the *Sense of Hearing* striketh the *Spirits* more immediately, than the other *Senses* ; and more incorporeally than the *Smelling*, For the *Sight*, *Tast*, and *Feeling*, have their *Organs*, not of so present and immediate Access to the *Spirits* as the *Hearing* hath. And as for the *Smelling* (which indeed worketh also immediately upon the *Spirits* and is forcible while the *Object* remaineth) it is with a communication of the *Breath*, or *Vapour* of the *Object* *Oderate* : But *Harmony* entring easily, and Mingling not at all, and Coming with a Manifest Motion ; doth by *Custom* of often affecting the *Spirits*, and Putting them into one kind of *Posture*, alter not a little the *Nature* of the *Spirits*, even when the *Object* is removed. And therefore we see that *Tunes* and *Aires*, even in their own nature, have in themselves some *Affinity* with the *Affectiōes* ; As there be *Merry Tunes*, *Dolefull Tunes*, *Solemn Tunes* ; *Tunes* inclining *Mens minds* to *Pity*, *Warlike Tunes*, &c. So as it is no marvell, if they alter the *Spirits* ; considering that *Tunes* have a *Predisposition* to the *Motion* of the *Spirits* in themselves. But yet it hath been noted, that though this variety of *Tunes*, doth dispose the *Spirits* to variety of *Passions*, conforme unto them ; yet generally, *Musick* feedeth that disposition of the *Spirits* which it findeth, We see also that severall *Airs*, and *Tunes*, do please severall *Nations*, and *Persons* according to the *Sympathy* they have with their *Spirits*.

Experiments
in Confort
touching
Sounds ; and
first touching
the Nullity,
and Entity
of Sounds.

Perspective hath been with some dilligence inquired ; and so hath the *Nature of Sounds*, in some sort, as far as concerneth *Musick* but the *Nature of Sounds* in generall, hath been superficially observed. It is one of the subtillest Pieces of Nature. And besides, I practise, as I do advise. Which is after long Inquiry of Things, Immerse in Matter, to enterpose some Subject, which is Immaterial, or lesse Material : Such as this of *Sounds* : To the end, that the intellect may be rectified, and become not Partiall.

115

It is first to be considered, what *Great Motions* there are in Nature, which pass without *Sound*, or *Noise*. The *Heavens* turn about, in a most rapide Motion, without *Noise* to us perceived ; I hough in some *Dreames* they have been said to make an excellent *Musick*. So the *Motions* of the *Comets*, and *Fiery Meteors* (as *Stella Cadens*, &c.) yield no *Noise*. And if it be thought, that it is the *Greatness* of distance from us, whereby the *Sound* cannot be heard ; We see that *Lightnings* and *Cornuscations*, which are near at hand, yield no *Sound* neither. And yet in all these, there is a *Percussion* and *Divission* of the *Air*. The *Winds* in the *Upper Region* (which move the *Clouds* above (which we call the *Rack*) and are not perceived below) passe without *Noise*. The lower *Winds* in a Plain, except they be strong, make no *Noise* ; But amongst *Trees*, the *Noise* of such *Winds* will be perceived. And the *Winds* (generally) when they make a *Noise*, do ever make it unequally, *Rising* and *Falling*, and sometimes (when they are vehement) *Trembling* at the hight of their *Blast*. *Rain* or *Hail* falling, (though vehemently) yieldeth no *Noise*, in passing through the *Air*, till it fall upon the *Ground*, *Water*, *Houses*, or the like. *Water* in a *River* (though a swift Stream, is not heard in the Channell but

but runneth in silence, if it be of any depth; But the very *Stream* upon *Shallows*, or *Gravel*, or *Pebble*, will be heard. And *Waters*, when they beat upon the *Shore*, or are straitned, (as in the falls of *Bridges*;) Or are dashed against themselves, by *Winds*, give a *Roaring Noise*. Any *peece of Timber*, or *Hard Body*, being thrust forwards by another *Body* Contiguous, without knocking giveth no *Noise*. And so *Bodies* in weighing, one upon another though the *upper Body* presse the *lower Body* down, make no *Noise*. So the *Motion* of the *Minute parts* of any *Solid Body*, (which is the Principall Cause of *Violent Motion*, though unobserved;) passeth without *Sound*; For that *Sound*, that is heard sometimes, is produced onely by the Breaking of the *Air*; And not by the Impulsion of the *Parts*. So it is manifest, that where the *Anterior Body* giveth way, at fast as the *Posterior* cometh on, it maketh no *Noise*, be the *Motion* never so great or swift.

Air open and at large, maketh no *Noise*, except it be sharply percussed; As in the *Sound* of a *String*, where *Aire* is purcussed by a hard and stiff *Body*, and with a sharp loose: For if the *String* be not strained, it maketh no *Noise*. But where the *Aire* is pent, and straitned, there *Breath*, or other *Blowing* (which carry but a gentle percussion,) suffice to create *Sound*: as in *Pipes* and *Wind-Instruments*. But then you must note that in *Recorders*, which go with a gentle *Breath*; the *Concave* of the *Pipe*, where it not for the *Fipple* that straitneth the *Aire* much more then the *Simple Concaves*;) would yield no *Sound*, For, as for other *Wind Instruments*, they require a forcible *Breath*, as *Trumpets*, *Cornets*, *Hunters Hornes*, &c. Which appeareth by the blown *Cheeks* of him that windeth them: *Organs* also are blown with a strong wind, by the *Bellows*. And note again, that some kind of *Wind Instruments*, are blown at a small hole in the side, which straineth the *Breath* at the first entrance; The rather, in respect of their *Traverse* and stop above the hole which performeth the *Fipples Part*; as it is seen in *Flutes* and *Fifes*, which will not give *Sound*, by a *Blast* at the end, as *Recorders* do, &c. Likewise, in all *Whistling*, you contract the *Mouth*; And to make it more sharp, Men sometimes use their *Finger*.

But in *Open Aire*, if you throw a *Stone*, or a *Dart*, they give no *Sound*: No more do *Bullets*, except they happen to be a little hollowed in the *Casting*; Which hollownes penneth the *Air*: Nor yet *Arrows* except they be ruffled in their *Feathers*, which likewise penneth the *Air*. As for *Small Whistles*, or *Shepherds Oaten Pipes*; they give a *Sound* because of their extreame slenderesse whereby the *Air* is more pent, than in a wider *Pipe*. Again the *Voices* of *Men* and *Living Creatures*, passe through the throat, which penneth the *Breath*. As for the *Jewes Harp* it is a sharp *Percussion*, and besides hath the vantage of penning the *Air* in the *Mouth*.

Solid Bodies, if they be very softly percussed, give no *Sound*, as when a *Man* treadeth very softly upon *Boards*. So *Chests* or *Doors* in fair weather, when they open easily give no *Sound*. And *Cart-wheels* squeek not when they are liquored.

The *Flame* of *Tapers* or *Candles*, though it be a swift *Motion*, and breaketh the *Air*, yet passeth without *Sound*. *Air* in *Ovens*, though (no doubt) it doth (as it were) boil, and dilate it self, and is repercussed; yet it is without *Noise*. *Flame* percussed by *Aire*, giveth a *Noise*; As in blowing of the *Fine* by *Bellows*; greater than if the *Bellows* should blow upon the *Air* it self. And so likewise *Flame* percussing the *Air* strongly (as when *Flame* suddenly taketh and openeth) giveth a *Noise*. So great *Flames*, whiles the one impelleth the other, give a bellowing *Sound*.

There

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There is a Conceit runneth abroad, that there should be a *White Powder*, which will discharge a piece without *Noise*. which is a dangerous Experiment if it should be true: For it may cause secret Murthers, But it seemeth to me impossible; For if the *Aire pent*, be driven forth and strike the *Air open*, it will certainly make a *Moise*. As for the *White Powder*, (if any such thing be that may extinguish, or dead the *Noise*) it is like to be a Mixture of *Petre*, and *Sulphur*, without *Coal*. For *Petre* alone will not take Fire. And if any Man think, that the *Sound* may be extinguished, or deaded, by discharging the *pent Air*, before it cometh to the *Mouth* of the *Peece*, and to the *Open Aire*; That is not probable; For it will make more divided *Sounds*: As if you should make a *Crosse Barrell* hollow, throw the *Barrel* of a *Peece*, it may be, it would give severall *Sounds*, both at the *Nose* and at the *sides*. But I conceive, that if it were possible to bring to passe, that there should be no *Air pent* at the *Mouth* of the *Peece* the *Bullet* might fly with small or no *Noise*. For first it is certain, there is no *Noise* in the *Percussion* of the *Flame* upon the *Bullet*. Next the *Bullet* in piercing thorow the *Air*, maketh no *Noise*, as hath been said. And then if there be no *Pent Air*, that striketh upon *Open Air*, there is no Cause of *Noise*; and yet the *Flying* of the *Bullet* will not be stayed. For that *Motion* (as hath been oft said) is in the *Parts* of the *Bullet*, and not in the *Air*. So as triall must be made by taking some small *Concave* of *Minall*, no more than you mean to fill with *Powder*, And laying the *Bullet* in the *Mouth* of it half out in the *open Aire*.

121

I heard it affirmed by a Man, that was a great Dealer in secrets, but he was but vain; that there was a *Conspiracy* (which himselfe hindred,) to have killed *Queen Mary*, sister to *Queen Elizabeth*, by a *Burning-Glasse*, when she walked in *Saint James Park*, from the *Leads* of the house. But thus much (no doubt) is true: that if *Burning-Glasses* could be brought to a great strength, (as they talk generally of *Burning-Glasses*, that are able to burn a *Navy*,) the *Percussion* of the *Air* alone, by such a *Burning-Glasse*, would make no *Noise*; no more than is found in *Corruscations*, and *Lightnings* without *Thunders*.

122

I suppose that *Impression* of the *Air* with *Sounds*, asketh a time to be conveyed to the *Sense*; As well as the *Impression* of *Species visibiles*. Or else they will not be heard. And therefore, as the *Bullet*, moveth so swift, that it is *Invisible*; so the same *swiftnesse* of *Motion* maketh it *Inaudible*: for we see that the apprehension of the *Eie*, is quicker then that of the *Ear*.

123

All *Eruptions* of *Air*, though small and slight, give an *Entity* of *Sound*; which we call *Crackling*, *Puffing*, *Spiting*, &c. As in *Bay-salt*, and *Bay-leaves* cast into the *Fire*; So in *Chestnuts*, when they leap forth of the *Ashes*; So in *Green Wood* laid upon the *Fire*, especially, *Rootes*; so in *Candles* that spit *Flame*, if they be wet: so in *Rasping*, *Sneezing*, &c. So in a *Rose leaf* gathered together into the fashion of a *Purse*, and broken upon the forehead, or Back of the *Hand* as *Children* use.

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Experiments
in Confort
touching Pro-
duction, Conser-
vation, and De-
struction of Sounds:
And the Office
of the Air
therein:

124

THe Cause given of *Sound*, that it should be an *Elision* of the *Air* (where by, if they mean any thing, they mean *Cutting* or *Dividing*, or else an *Attenuating* of the *Aire*) is but a *Terme of Ignorance*: And the *Motion* is but a *Catch* of the *Wit* upon a few instances; as the *Manner* is in the *Philosophy Received*. And it is common with *Men*, that if they have gotten a *Pretty Expression* by a *Word of Art*, that *Expression* goeth current; though it be empty of *Matter*. This Conceit of *Elision*, appeareth most manifestly

to

to be false, in that the *sound* of a *Bell String*, or the like, continueth melting, sometime, after the *Percussion*; but ceaseth straight-waies, if the *Bell*, or *String*, be touched and stayed: whereas if it were the *Elifion* of the *Air*, that made the *Sound*, it could not be, that the *Touch* of the *Bell* or *String* should extinguiſh ſo ſuddenly that *Motion*, cauſed by the *Elifion* of the *Air*. This appeareth yet more manifeſtly, by *Chiming* with a *Hammer* upon the *Out-side* of a *Bell*; For the *Sound* will be according to the inward *Concave* of the *Bell*; whereas the *Elifion* or *Attenuation* of the *Air* cannot be, but only between the *Hammer* and the *Out-side* of the *Bell*. So again if it were an *Elifion*, a broad *Hammer*, and a *Bodkin*, ſtruck upon *Metall*, would give a diſerſe *Tone*; as well as a diſerſe *Loudneſs*: But they do not ſo; For though the *Sound* of the one be *Louder*, and of the other *Softer*, yet the *Tone* is the ſame. Beſides, in *Eccho's* (whereof ſome are as loud as the *Originall Voice*,) there is no new *Elifion*, but a *Repercution* onely. But that, which convinceth it moſt of all, is, that *Sounds* are generated, where there is no *Air* at all. But theſe and the like *Conceits*, when Men have cleared their underſtanding, by the light of *Experience*, will ſcatter and break up like a *Miſt*.

It is certain, that *Sounds* is not produced at the firſt, but with ſome *Locall Motion* of the *Air*, or *Flame*, or ſome other *Medium*; Nor yet without ſome *Reſiſtance*, either in the *Air*, or the *Body Percuſſed*. For if there be a meer *Yielding* or *Ceſſion*, it produceth no *Sound*, as hath been ſaid. And therein *Sounds* differ from *Light*, and *Colours*, which paſſe through the *Air*, or other *Bodies*, without any *Locall Motion* of the *Air*; either at the firſt, or after. But you muſt attentively diſtinguiſh between the *Locall Motion*, of the *Air* (which is but *Vehiculum cauſe*, a *Carrier of the Sounds*,) and the *Sounds* themſelves, *Conveighed* in the *Air*. For as to the former, we ſee manifeſtly, that no *Sound* is produced (no not by *Air* it ſelfe againſt other *Air*, as in *Organs*, &c.) but with a perceptible *Blaſt* of the *Air*; and with ſome *Reſiſtance* of the *Air* ſtrucken. For, even all *Speech*, (which is one of the gentleſt *Motions* of *Air*;) is with *Expulſion* of a little *Breath*. And all *Pipes* have a *Blaſt*, as well as a *Sound*. We ſee alſo manifeſtly, that *Sounds* are carried with *Wind*: And therefore *Sounds* will be heard further with the *Wind*, than againſt the *Wind*: and likewise do riſe and fall with the *Intenſion* or *Remiſſion* of the *Wind*. But for the *Impreſſion* of the *Sound*, it is quite another *Thing*, and is utterly without any *Locall Motion* of the *Air*, *Perceptible*; and in that reſembleth the *Species Viſible*: For after a *Man* hath lured, or a *Bell* is rung, we cannot diſcern any *Perceptible Motion* (at all) in the *Air*, as long as the *ſound* goeth, but only at the firſt. Neither doth the *Wind* (as far as it carrieth a *Voice*;) with the *Motion* thereof, confound any of the *Delicate*, and *Articulate Figurations* of the *Air*, in variety of *Words*. And if a *Man* ſpeak a good loudneſs, againſt the *Flame* of a *Candle*, it will not make it tremble much; though moſt, when thoſe *Letters* are pronounced, which contract the mouth; as *F*, *S*, *V*, and ſome others. But *Gentle Breathing*, or *Blowing* without *Speaking*, will move the *Candle* farre more. And it is the more probable, that *Sound* is without any *Locall Motion* of the *Air*, becauſe as it differeth from the *Sight*, in that it needeth a *Locall Motion* of the *Air* at firſt; So it paralleleth in ſo many other things with the *Sight*, and *Radiation* of *Things inviſible*; which (without all queſtion) induce no *Locall Motion* in the *Air*, as hath been ſaid.

Nevertheless it is true, that upon the *Noiſe* of *Thunder*, and great *Ordinance*; *Glaſs windows* will ſhake; and *Fishes* are thought to be frayed with

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with the Motion, caused by *Noise* upon the water. But these effects are from the Locall Motion of the *Air*, which is a Concomitant of the *Sound*, (as hath been said) and not from the *Sound*.

127

It hath been anciently reported, and is still received, that *Extream applauses*, and *shouting of people* assembled in great Multitudes, have so rarified, and broken the *Air*, that *Birds*, flying over, have fallen down, the *Air* being not able to support them. And it is believed by some, that *great Ringing of Bells* in populous Cities, hath chased away *Thunder*: and also dissipated *Pestilent Air*: All which may be also from the Concussion of the *Air*, and not from the *Sound*.

128

A very great *Sound*, near hand, hath stricken many *Deaf*; and at the Instant they have found, as it were, the breaking of a *Skin of Parchment* in their *Ear*: and my self, standing near one that *Lured* loud and shrill, had suddenly an Offence, as if somewhat had broken, or been dislocated in my *Ear*; and immediately after a *Loud Ringing*; (Not an ordinary Singing, or *Hissing*, but farre louder, and differing:), so as I feared some *Deafness*. But after some half *Quarter of an Hour* it vanished. This Effect may be truly referred unto the *Sound*: for (as is commonly received) an over-potent *Object* doth destroy the *Sense*; and *Spiritual Species*, (both *Visible* and *Audible*;) will work upon the *Sensories*, though they move not any other *Body*.

129

In *Delation of Sounds*, the enclosure of them preserveth them, and causeth them to be heard further. And we find in rowls of *Parchment*, or *Truncks*, the *Mouth* being laid to the one end of the rowl of *Parchment*, or *Trunck*, and the *Ear* to the other, the *Sound* is heard much further, then in the *Open Air*. The Cause is, for that the *Sound* spendeth, and is dissipated in the *Open Air*; but in such *Concaves* it is conserved, and contracted. So also in a *Piece of Ordnance*, if you speak in the *Touch-hole*, and another lay his *Ear* to the *Mouth* of the *Piece*, the *Sound* passeth, and is far better heard, than in the *Open Air*.

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It is further to be considered, how it proveth & worketh, when the *Sound* is not enclosed, all the *Length* of his way, but passeth partly through open *Air*; as where you speak some distance from a *Trunck*; or where the *Ear* is some distance from the *Trunck*, at the other End; or where both *Mouth* and *Ear* are distant from the *Trunck*. And it is tryed, that in a long *Trunck*, of some eight or ten foot, the *Sound* is holpen, though both the *Mouth*, and the *Ear* be a handfull, or more, from the Ends of the *Trunck*; and somewhat more holpen, when the *Ear* of the *Hearer* is near, than when the *Mouth* of the *speaker*. And it is certain, that the *Voice* is better heard in a *Chamber* from *Abroad*, than *Abroad* from within the *Chamber*.

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As the *Enclosure*, that is *Round about* and *Entire*, preserveth the *Sound*; so doth a *Semi-concave*, though in a less degree. And therefore, if you divide a *Trunck*, or a *Cane* into two, and one speak at the one end, and you lay your *Ear* at the other, it will carry the *Voice* further, than in the *Air* at large. Nay further, if it be not a full *Semi-concave*; but if you do the like upon the *Mast* of a *Ship*, or a *long Pole*, or a *Piece of Ordnance* (though one speak upon the *Surface* of the *Ordnance*, and not at any of the *Bores*;) the *Voice* will be heard further, then in the *Air* at large.

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It would be tryed, how, and with what proportion of disadvantage, the *Voice* will be carried in an *Horn*, which is a line *Arched*; Or in a *Trumpet*, which is a line *Retorted*; Or in some *Pipe* that were *Sinuuous*.

It is certain, (howsoever it cros the Received Opinion) that *sounds* may be created without *Air*, though *Air* be the most favorable *Different* of *sounds*. Take a *Vessel* of *Water*, and knap a pair of *Tongs* some depth within the *Water*, and you shall hear the *Sound* of the *Tongs* well, and not much diminished; and yet there is no *Air* at all present.

Take one *Vessel* of *Silver*, and another of *Wood*, and fill each of them full of *Water*, and then knap the *Tongs* together, as before, about an handful from the *Bottom*, and you shall find the *Sound* much more *Resounding* from the *Vessel* of *Silver*, than from that of *Wood*: And yet if there be no *water* in the *Vessel*, so that you knap the *Tongs* in the *Air*, you shall find no difference between the *Silver* and the *Wooden Vessel*. whereby beside the main point of creating *Sound* without *Air*, you may collect two Things: The one, that the *Sound* communicateth with the *Bottom* of the *Vessel*: The other, that such a *Communication* passeth far better, thorow *Water* than *Air*.

Strike any *Hard Bodies* together, in the midst of a *Flame*, and you shall hear the *Sound* with little difference, from the *Sound* in the *Air*.

The *Pneumaticall Part*, which is in all *Tangible Bodies*, and hath some *Affinity* with the *Air*; performeth, in some degree, the *Parts* of the *Air*; as when you knock upon an *Empty Barrell*, the *Sound* is (in part) created by the *Air* on the *Out-side*; and (in part) by the *Air* in the *Inside*; For the *Sound* will be greater or lesser, as the *Barrell* is more *Empty*, or more *Full*; But yet the *Sound* participateth also with the *Spirit* in the *Wood*, thorow which it passeth from the *Out-side* to the *Inside*: and so it cometh to pass in the *Chiming* of *Bells*, on the *Out-side*; where also the *Sound* passeth to the *Inside*: And a number of other like *Instances*, whereof we shall speak more when we handle the *Communication* of *Sounds*.

It were extreame *Grossness* to think, (as we have partly touched before,) that the *Sound* in *strings* is made, or produced between the *Hand* and the *string*, or the *Quill* and the *string*, or the *Bow* and the *string*: For those are but *Vehicula motus*, *Passages* to the *Creation* of the *Sound*, the *Sound* being produced between the *string* and the *Air*; and that not by any *Impulsion* of the *Air* from the first *Motion* of the *string*; but by the *Return* or *Reult* of the *string*, which was strained by the *Touch*, to his former *Place*: which *Motion* of *Result* is quick and sharp; Whereas the first *Motion* is soft and dull. So the *Bow* tortureth the *string* continually, and thereby holdeth it in a *Continuall Trepidation*.

Take a *Trunch*, and let one whistle at the one *End*, and hold your *Ear* at the other, and you shall find the *Sound* strike so sharp, as you can scarce endure it. The *Cause* is, for that *Sound* diffuseth it self in round, and so spendeth it self; But if the *Sound*, which would scatter in *Open Air*, be made to go all into a *Canalo*; It must needs give greater force to the *Sound*. And so you may note, that *Inclosures*, do not only preserve *Sound*, but also encrease and sharpen it.

A *Hunters Horn*, being greater at one *End*, than at the other, doth encrease the *Sound* more, than if the *Horn* were all of an equal *Bore*. The *Cause* is, for that the *Air* and *Sound*, being first contracted at the lesser *End*, and afterwards having more *Room* to spread at the greater *End*, do dilate themselves; and in coming out strike more *Air*; whereby the *Sound* is the *Greater*, and *Baser*. And even *Hunters Horns*, which are sometimes made straight, and not *Oblique*, are ever greater at the lower *end*. It would

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Experiments in Confort touching the Magnitude, and Exility, and Damps of Sounds.

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be tried also in *Pipes*, being made *far larger* at the lower End: Or being made with a *Belly* towards the lower End; and then issuing into a straight Concave again.

140 There is, in *Saint James's Fields*, a *Conduit* of Brick, unto which joyneth a *low Vault*; and at the End of that, a *Round House* of Stone: And in the *Brick Conduit* there is a *Window*, and in the *Round House* a *Slit* or *Rift* of some little breadth: if you cry out in the *Rift*, it will make a fearful roaring at the *Window*. The *Cause* is the same with the former; For that all *Concaves*, that proceed from more *Narrow* to more *Broad*, do amplify the *Sound* at the *Coming out*.

141 *Hawks Bells*, that have *Holes* in the *Sides*, give a greater *Ring*, than if the *Pellet* did strike upon *Brass*, in the *Open Air*. The *Cause* is the same with the first *Instance* of the *Trunck*; Namely, for that the *Sound*, Enclosed with the *Sides* of the *Bell*, cometh forth at the *Holes* unspent and more strong.

142 In *Drums*, the *Glofeness* round about, that preserveth the *Sound* from dispersing, maketh the *Noise* come forth at the *Drum-Hole*, far more loud, and strong, than if you should strike upon the like *Skin*, extended in the *Open Air*. The *Cause* is the same with the two precedent.

143 *Sounds* are better heard, and further off, in an *Evening*, or in the *Night*, than at the *Noon*, or in the *day*. The *Cause* is, for that in the *Day*, when the *Air* is more *Thin*, (no doubt) the *Sound* pierceth better; But when the *Air* is more *Thick* (as in the *Night*) the *Sound* spendeth and spreadeth abroad less: And so it is a *Degree* of *Enclosure*. As for the *Night*, it is true also, that the *Generall* silence helpeth.

144 There be two kinds of *Reflections* of *Sounds*; the one at *Distance*, which is the *Eccho*; Wherein the *Originall* is heard distinctly, and the *Reflexion* also distinctly. Of which we shall speak hereafter: The other in *Concurrence*, When the *Sound* Reflecting (the *Reflexion* being near at hand) returneth immediately upon the *Originall*, and so iterateth it not, but amplifieth it. Therefore we see, that *Musick* upon the *Water* soundeth more; and so likewise *Musick* is better in *Chambers* *Wainscotted*, than *Hanged*.

145 The *strings* of a *Lute* or *Violl*, or *Virginals*, do give a far greater *Sound*, by reason of the *Knot* and *Board*, and *Concave* underneath, than if there were nothing but only the *Flat* of a *Board*, without that *Hollow* and *Knot*, to let in the *Upper Air* into the *Lower*. The *Cause* is, the *Communication* of the *Upper Air* with the *Lower*; and penning of both from *Expence*, or *Dispersing*.

146 An *Irish Harp* hath *Open Air* on both sides of the *strings*: And it hath the *Concave* or *Belly*, not a long the *strings* but at the End of the *strings*. It maketh a more *Resounding* *Sound*, than a *Bandora*, *Orpharion*, or *Cittern*, which have likewise *Wire-strings*. I judge the *Cause* to be, for that *Open Air* on both sides helpeth, so that there be a *Concave*; Which is therefore best placed at the End.

147 In a *Virginal*, when the *Lid* is down, it maketh a more *exile* *Sound*, than when the *Lid* is open. The *Cause* is, for that all *shutting in* of *Air*, where there is no *Competent Vent*, dampeth the *sound*: Which maintaineth likewise the former *Instance*; For the *Belly* of the *Lute*, or *Violl*, doth pen the *Air* somewhat.

148 There is a *Church* at *Glocester*, (and as I have heard the like is in some other places;) where if you speak against a *Wall*, softly, another shall hear your *Voice* better a good way off, than near hand. Enquire more particularly of the *Fame* of that place. I suppose there is some *Vault*, or *Hollow*,

Hollow, or Ille, behind the Wall, and some Passage to it towards the further end of that Wall against which you speak; So as the voice of him that speaketh slideth along the Wall, and then entreth at some Passage, and communicateth with the *Aire* of the Hollow; for it is preserved somewhat by the plain Wall; but that is too weak to give a *Sound* Audible, till it hath communicated with the back *Air*.

Strike upon a *Bow-string*, and lay the *Horn* of the *Bow* near your Ear, and it will encrease the *Sound*, and make a degree of a *Tone*. The Cause is for that the Sensory, by reason of the Close holding, is percussed, before the *Air* disperseth. The like is, if you hold the *Horn* betwixt your Teeth. But that is a plain *Delation* of the *Sound*; from the Teeth to the Instrument of hearing; for there is a great intercourse between those two Parts; as appeareth by this that a harsh *grating Tune* setteth the Teeth one edge. The like falleth out if the *Horn* of the *Bow* be put upon the Temples; But that is but the slide of the *Sound* from thence to the Ear.

if you take a *Rod* of *Iron* or *Brasse*, and hold the one end to your Ear, and strike upon the other, it maketh a far greater *Sound*, than the like stroke upon the *Rod*, not made so contiguous to the Ear. By which and by some other instances, that have been partly touched, it should appear, that *Sounds* do not onely slide upon the surface of a smooth Body, but do also communicate with the Spirits, that are in the Pores of the Body,

I remember in *Trinity-Colledge* in *Cambridge*, there was an *Upper-Chamber*, which being thought weak in the Roof of it, was supported by a Pillar of *Iron*, of the Bignesse of ones Arm, in the midst of the *Chamber*; which if you had struck, it would make a little flat Noise in the *Room*, where it was struck; but it would make a great Bomb in the *Chamber* beneath.

The *Sound* which is made by *Buckets* in a *Well*: when they touch upon the *Water*; or when they strike upon the side of the *Well*, or when two *Buckets* dash the one against the other; These *Sounds* are deeper and fuller, than if the like Percussion were made in the *Open Aire*. The Cause is the penning and enclosure of the *Aire* in the Concave of the *Well*.

Barrells placed in a Room under the Floor of a *Chamber*, make all *Noises* in the same Chamber more full and Resounding.

So that there be five wayes (in generall) of Majoration of Sounds: Enclosure Simple; Enclosure ith' Dilatation; Communication; Reflexion; Concurrent; and Approach to the Sensory.

For Exility of the Voice, or other Sounds: It is certain, that the Voice doth pass thorow Solid and Hard Bodies, if they be not too thick. And thorow *Water* which is likewise a very Close Body; and such an one as letteth not in *Air*. But then the Voice or other Sound is reduced, by such passage, to a great Weaknesse or Exility. If therefore you stop the Holes of a *Hawks Bell*, it will make no Ring but a flat Noise or Rattle. And so doth the *Attities* or *Eagles Stone* which hath a little Stone within it.

And as for *Water* it is a certain Triall: Let a man go into a Bath, and take a *Pail* and turn the Bottome upward, and carry the Mouth of it (Even) down to the Levell of the *Water*, and so presse it down under the *Water* some handfull and an halfe, still keeping it even, that it may not tilt on either side and so the *Air* get out: Then let him that is in the Bath, dive with his head so far under *Water*, as he may put his head into the *Pail*, and there will come as much *Air* bubling forth, as will utake Roome for his Head. Then let him speak, and any that shall stand without, shall hear his Voice plainly, but yet made extreme sharp and exile, like the Voice of

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Puppets : But yet the *Articulate Sounds* of the *Words* will not be confounded. Note that it may be much more handsomly done, if the *Pail* be put over the *Mans* head above *Water*, and then he cower down, and the *Pail* be pressed down with him. Note that a man must kneel or sit, that he may be lower than the *Water*. A man would think, that the *Scicilian Poet* had knowledge of this *Experiment* ; for he saith, that *Hereules's* *Rage* *Hylas* went with a *Water-pot*, to fill it at a pleasant *Fountain*, that was near the shore, and that the *Nymphs* of the *Fountain* fell in love with the *Boy*, and pulled him under *Water*, keeping him alive ; and that *Hercules*, missing his *rage*, called him by his Name aloud, that all the shore rang of it ; and that *Hylas*, from within the *Water* answered his Master ; but (that which is to the present purpose) with so small and exile a *Voice*, as *Hercules* thought he had been three miles off, when the *Fountain* (indeed) was fast by.

156 In *Lutes* and *Instruments* of *Strings*, if you, stop a *String* high, (whereby it hath lesse scope to tremble) the *Sound* is more *Treble*, but yet more dead.

157 Take two *Sawcers*, and strike the *Edge* of the one against the *Bottom* of the other, within a *Pail* of *Water* ; And you shall finde that as you put the *Sawcers* lower, and lower, the *Sound* groweth more flat ; even while Part of the *sawcer* is above the *Water* ; But that flatnesse of *Sound* is joyned with a harshnesse of *Sound* ; which (no doubt) is caused by the inequality of the *Sound*, which cometh from the part of the *Sawcer* under the *Water*, and from the Part above. But when the *Sawcer* is wholly under the *Water*, the *Sound* becometh more clear, but far more low ; And as if the *Sound* came from a far off.

158 A soft *Body* dampeth the *Sound*, much more than a hard : And if a *Bell* hath *Cloth* or *Silke* wrapped about it, it deaderth the *Sound* more than if it were *Wood*. And therefore in *Clericalls*, the *Keyes* are lined ; and in *Colledges* they use to line the *Table-men*.

159 Trial was made in a *Recorder* after these severall manners. The *Bottom* of it was set against the *Palme* of the *Hand* ; stopped with *Wax* round about, set against a *Damask Cushion* ; Thrust into *Sand*, into *Asbes*, into *Water*, (half an *Inch* under the *Water*) Close to the *Bottom* of a *silver Basin*, and still the *Tone* remained : But the *Bottom* of it was set against a *Woollen Carpet*, a *Lining* of *Plush*, a *Lock* of *Wool*, (though loosely put in ;) Against *Snow* ; and the sound of it was quite deaded, and but *Breath*.

160 *Iron* Hot produceth not so full a *Sound*, as when it is Cold ; For while it is hot, it appeareth to be more Soft, and lesse Resounding. So likewise *Warm Water*, when it faileth, maketh not so full a *Sound*, as *Cold* : And I conceive it is softer, and nearer the *Nature* of *Oile* ; For it is more slippery As may be perceived, in that it scowreth better.

161 Let there be a *Recorder* made, with two *Fipples* at each end one ; The *Trunck* of it of the length of two *Recorders*, and the holes answerable towards each end ; and let two play the same lesson upon it, at an *Unison* ; And let it be noted, whether the *Sound* be confounded, or amplified, or dulled. So likewise let a *Cross* be made, of two *Trunks* (thorowout) hollow ; and let two speak or sing, the one long wayes the other traverse : And let two hear at the opposite Ends ; and note, whether the *Sound* be confounded, amplified, or dulled. Which two *Instances* will also give light to the *Mixture* of *Sounds* ; whereof we shall speak hereafter.

162 A *Bellows*, blown into the *Hole* of a *Drum*, and the *Drum* then stricken, maketh

maketh the *Sound* a little flatter, but no other apparent Alteration. The *Cause* is manifest; Partly for that it hindreth the issue of the *Sound*; And partly for that it maketh the *Air* being blown together, leis moveable.

The *Loudnesse* and *Softnesse* of *Sounds*, is a thing distinct from the *Magnitude* and *Exility* of *Sounds*; for a *Base string*, though softly stricken, giveth the greater *Sound*; but a *Treble string*, if hard stricken, will be heard much further off. And the *Cause* is, for that the *Base string* striketh more *Air*; and the *Treble* lesse *Air*, but with a sharper percussio.

It is therefore the *strength* of the *Percussion*, that is a principall *Cause* of the *Loudnesse* or *Softnesse* of *Sounds*: as in knocking harder or softer; Winding of a *Horn* stronger or weaker; Ringing of an *Hand-bell* harder or softer, &c. And the *strength* of this *Percussion* consisteth, as much or more, in the *Hardnesse* of the *Body Percussed*, as in the *Force* of the *Body Percussing*: For if you strike against a *Cloth*, it will give a lesse *Sound*, if against *Wood* a greater, if against a *Mettal*, yet a greater; and in *Metals* if you strike against *Gold*, (which is the more pliant) it giveth the flatter *Sound*; If against *Silver* or *Brasse*, the more Ringing *Sound*. As for *Air*, where it is strongly pent it matcheth a *Hard Body*. And therefore we see in discharging of a *Peece* what a great noise it maketh. We see also that the *Charge* with *Bullet*, Or with *Paper* wet, and hard stoped; or with *Powder* alone rammed in hard, maketh no great difference in the *Loudnesse* of the *Report*.

The *Sharpnesse* or *Quicknesse* of the *Percussion*, is a great *Cause* of the *Loudnesse*, as well as the *Strength*: As in a *Whip* or *Wand*, if you strike the *Air* with it; the sharper and quicker you strike it, the *Louder Sound* it giveth. And in playing upon the *Lute*, or *Virginals*, the quick stroke or touch is a great life to the *Sound*. The *Cause* is, for that the quick striking cutteth the *Air* speedily, whereas the soft striking doth rather beat than cut.

The *Communication* of *Sounds* (as in *Bellies* of *Lutes*, *Empty Vessels*, &c) hath been touched obiter, in the *Majoration* of *Sounds*: But it is fit also to make a *Title* of it apart.

The *Experiment*, for greatest *Demonstration* of *Communication* of *Sounds*, is the *Chiming* of *Bells*; where if you strike with a *Hammer* upon the upper *Part*, and then upon the *Midst*, and then upon the *Lower*, you shall find the *Sound* to be more *Treble*, and more *Base*, according unto the *Concave*, on the *Inside*: though the *Percussion* be onely on the *Outside*.

When the *Sound* is created between the *Blast* of the *Mouth*, and the *Air* of the *Pipe* it hath nevertheless some *Communication* with the *Matter* of the *Sides* of the *Pipe*, and the *Spirits* in them contained; for in a *Pipe* or *Trumpet*, of *Wood* and *Brasse*, the *Sound* will be diverse; so if the *Pipe* be covered with *Cloth* or *Silke* it will give a diverse *Sound*, from that it would do of it selfe; so if the *Pipe* be a little wet on the *Inside*, it will make a differing *Sound*, from the same *Pipe* dry.

That *Sound* made within *Water*, doth communicate better with a hard *Body* thorow *Water*, than made in *Air*, it doth with *Air*; Vide *Experimentum*, 134.

We have spoken before (in the *Inquisition* touching *Musick*) of *Musicall Sounds*, whereunto there may be a *Concord* or

Experiments
in Confort
touching the
Loudness or
Softness of
Sounds; and
their Carriage
at longer or
shorter distance

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Experiments
in Confort
touching the
Communication
of *Sounds*.

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Experiments
in Confort
touching, *E-*
quality and *In-*
equality of
Sounds.

Discord in two Parts; which Sounds we call *Tones*; and likewise of *Immusicall Sounds*, And have given the Cause, that the Tone proceedeth of *Equality*, and the other of *Inequality*: And we have also expressed there, what are the *Equall Bodies* that give *Tones*, and what are the *Unequall* that give none. But now we shall speak of such *Inequality of Sounds*, as proceedeth, not from the Nature of the Bodies themselves, but is *Accidental*, Either from the *Roughness*, or *Obliquity* of the *Passage*; or from the *Doubling* of the *Percutient*; Or from the *Trepidation* of the *Motion*:

169 A Bell if it have a *Rift* in it, whereby the *Sound* hath not a clear *Passage*, giveth a *Hoarse* and *Jarring Sound*; So the *Voice of Man*, when by Cold taken the *Wesill* groweth rugged, and (as we call it) furred, becometh hoarse. And in these two *Instances* the *Sounds* are *Ingrate*; because they are meerly *Unequal*, But if they be *Unequall* in *Equality*, then the *Sound* is *Gratefull* but *Purling*.

170 All *Instruments*, that have either *Returns*, as *Trumpets*; or *Flexions*, as *Cornets*; or are *Drawn up*, and *Put from*, as *Sackbuts*; have a *Purling Sound*: But the *Recorder* or *Flute* that have none of these *Inequalities*, give a clear *Sound*. Neverthelesse the *Recorder* it selfe, or *Pipe* moistened alittle in the *Inside*, soundeth more solemnly, and with a little *Purling*, or *Hissing*. Again, a *Wreathed String*, such as are in the *Base Striugs* of *Bandoraes*, giveth also a *Purling Sound*.

171 But a *Lute-string*, if it be meerly *Unequall* in his *Parts*, giveth a *Harsh* and *Untuneable Sound*, which *Strings* we call *False*, being bigger in one *Place* than in another; And therefore *Wire-strings* are never *False*. We see also, that when we try a *False Lute-string*, we use to extend it hard between the *Fingers* and to fillip it; and if it giveth a double *Species* it is *True*, but if it giveth a *treble* or more, it is *False*.

172 *Waters*, in the *Noise* they make as they runne, represent to the *Ear* a *Trembling noise*; and in *Regals* (where they have a *Pipe*, they call the *Nightingale Pipe*, which containeth *Water*) the *Sound* hath a continuall *Trembling*: And *Children* have also little things they call *Cocks*, which have *Water* in them; And when they blow, or whistle in them, they yield a *Trembling Noise*, which *Trembling* of *Water*, hath an affinity with the Letter *L*. All which *Inequalities* of *Trepidation*, are rather pleasant, than otherwise.

173 All *Base Notes*, or very *Treble Notes*, give an *Asper Sound*; for that the *Base* striketh more *Air*, than it can well strike *Equally*: and the *Treble* cutteth the *Air* so sharp as it returneth too swift, to make the *Sound* *Equal*; and therefore a *Mean* or *Tenor* is the *sweetest Part*.

174 We know Nothing that can at pleasure make a *Musical* or *Immusicall Sound*, by voluntary *Motion*, but the *Voice of Man* and *Birds*. The Cause is (no doubt) in the *Wesill* or *Wind-pipe*, (which we call *Asperia Arteria*), which being well extended, gathered *Equality*; as a *Bladder* that is wrinkled, if it be extended, becometh smooth. The extension is alwayes, more in *Tones*, than in *Speech*: Therefore the *Inward Voice* or *whisper* can never give a *Tone*: And in *Singing*, there is (manifestly) a greater *Working* and *Labour* of the *Throat*, than in *Speaking*; as appeareth in

in the Thrusting out or Drawing in of the Chin, when we sing.

The *Humming of Bees* is an *Unequall Buzzing*, and is conceived, by some of the Ancients, not to come forth at their Mouth, but to be an *Inward Sound*: but (it may be) it is neither; but from the motion of their Wings; for it is not heard, but when they stir.

All *Metals quenched in Water*, give a *Sibillation* or *Hissing sound*; (which hath an Affinity with the letter *Z*.) notwithstanding the *Sound* be created between the *Water* or *Vapour*, and the *Air*. *Seething* also, if there be but small store of *Water*, in a *Vessel*, giveth a *Hissing Sound*; but *Boyling* in a full *Vessel* giveth a *Bubbling Sound*, drawing somewhat near to the *Cocks* used by Children.

Triall would be made, whether the *Inequality*, or interchange of the *Medium*, will not produce an *Inequality of Sound*; as if three *Bells* were made one within another and *Air* betwixt each; and then the outermost *Bell* were chimed with a *Hammer*, how the *Sound* would differ from a simple *Bell*. So likewise take a *Plate of Brasse*, and a *Plank of Wood*, and joyn them close together, and knock upon one of them, and see if they do not give an *unequal Sound*. So make two or three *Partitions of Wood*, in a *Hogshead*, with *Holes* or *Knots* in them; and mark the difference of their *Sound*, from the *Sound* of an *Hogshead*, without such *Partitions*.

IT is evident that the *Percussion* of the *Greater Quantity of Air*, causeth the *Basfer Sound*; and the less *Quantity* the more *Treble Sound*. The *Percussion* of the *Greater quantity of Air*, is produced by the *Greatness of the Body Percussing*; by the *latitude of the Concave*, by which the *Sound* passeth; and by the *Longitude* of the same *Concave*. Therefore we see that a *Base-string* is greater than a *Treble*; A *Base-pipe* hath a greater bore than a *Treble*; And in *Pipes* and the like, the lower the *Note holes* be, and the further off from the *Mouth of the Pipe*, the more *Base Sound* they yield; and the nearer the *Mouth* the more *Treble*. Nay more if you strike an *Entire Body*, as an *An-diron of Brasse*, at the *Top* it maketh a more *Treble Sound*, and at the *Bottom* a *Basfer*.

It is also evident, that the *Sharper* or *Quicker Percussion of Air* causeth the more *Treble Sound*, and the *Slower* or *Heavier*, the more *Base Sound*. So we see in *Strings*; the more they are wound up and strained; (And thereby give a more quick start back, the more *Treble* is the *Sound*. And the slacker they are, or less wound up, the *Basfer* is the *Sound*. And therefore a bigger *String* more strained, and a lesser *String* less strained, may fall into the same *Tone*.

Children, Women, Eunuchs have more small and shrill *Voices* than *Men*. The Reason is, not for that *Men* have greater heat, which may make the *Voice* stronger, (for the strength of a *Voice* or *Sound* doth make a difference in the *Loudness* or *Softness*, but not in the *Tone*;) but from the *Dilatation* of the *Organ*; which (it is true) is likewise caused by *Heat*. but the Cause of *Changing the Voice*, at the years of *Puberty* is most obscure. It seemeth to be, for that when much of the *Moisture* of the *Body*, which did before irrigate the *Parts*, is drawn down to the *Spermatick vessels*, it leaveth the *Body* more hot than it was; whence cometh the dilatation of the *Pipes*: For wee see plainly all effects of *Heat*, do then come on; as *Pilosity*, more *Roughness* of the *Skin*, *hardness* of the *Flesh*, &c.

The industry of the *Musitian*, hath produced two other Means of *straining*, or *Intension of Strings*, besides their *Winding up*. The one is the *Stopping* of

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Experiments in Consonance touching the more Treble & the more Base Tones or Musickall Sounds.

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of the *String* with the *Finger*; as in the Necks of *Lutes*, *Viols*, &c. The other is the *shortnesse* of the *String*: as in *Harps*, *Virginals*, &c. Both these have one and the same reason; for they cause the *String* to give a quicker start.

182 In the *straining* of a *String* the further it is strained, the lesse *superstraining* goeth to a *Note*; For it requireth good winding of a *String*, before it will make any *Note* at all: And in the stops of *Lutes*, &c. the higher they go, the lesse distance is between the *Frets*.

183 If you fill a *Drinking Glasse* with *Water*, (especially one sharp below, and Wide above and fill upon the *Brim*, or outside; and after, empty Part of the *Water* and so more and more, and still try the *Tone*, by *Fillipping*; you shall find the *Tone* fall, and be more *Base* as the *Glass* is more empty.

Experiments
in Confort
touching the
Proportion of
Treble and
Base Tones.

The Just and Measured Proportion of the *Air Percussed*, towards the *Basenesse* or *Trebleness* of *Tones*, is one of the greatest Secrets in the Contemplation of *Sounds*. For it discovereth the true Coincidence of *Tones* into *Diapasons*; Which is the Returne of the same *Sound*. And so of the *Concords* and *Discords*, between the *Unison* and *Diapason*; Which we have touched before, in the *Experiments* of *Musick*; but think fit to resume it here, as a principall part of our Enquiry touching the *Nature* of *Sounds*. It may be found out in the *Proportion* of the *Winding* of *Strings*; In the *Proportion* of the *Distance* of *Frets*; and in the *Proportion* of the *Concave* of *Pipes*, &c. But most commodiously in the last of these.

184 Try therefore the *Winding* of a *String* once about, as soon as it is brought to that Extension as will give a *Tone*, and then of twice about, and thrice about, &c. And marke the Scale or Difference of the *Rise* of the *Tone*; whereby you shall Discover in one, two Effects; Both the *Proportion* of the *Sound* towards the *Dimension* of the *Winding*; and the *Proportion* likewise of the *Sound* towards the *String*, as it is more or lesse strained. But note that to measure this, the way will be, to take the *Length* in a right Line of the *string*, upon any *Winding* about of the *Peg*.

185 As for the stops you are to take the *Number* of *Frets*, and principally the *Length* of the *Line*, from the first stop of the *String*, unto such a stop as shall produce a *Diapason* to the former stop, upon the same *String*.

186 But it will best (as it is said) appear, in the *Bores* of *Wind-Instruments*: And therefore cause some halfe dozen *Pipes* to be made in length, and all things else a like, with a single double, and so one to a sextuple *Bore*; And so mark, what fall of *Tone* every one giveth. But still in these three last Instances, you must dilligently observe, what *Length* of *string*, or *Distance* of stop, or *Concave* of *Air*, maketh what *Rise* of *Sound*. As in the last of these (which as we said) is that, which giveth the aptest demonstration,) you must set down what *Encrease* of *Concave* goeth to the making of a *Note* higher, and what of two *Notes*, and what of three *Notes*; and so up to the *Diapason*: For then the great Secret of *Numbers* and *Proportions* will appear: It is not unlikely, that those that make *Recorders*, &c. know this already: for that they make them in *Sets*. And likewise *Bell-Founders* in fitting the

the tune of their Bells. So that Enquiry may save Trial. Surely, it hath been observed by one of the Ancients, that an Empty Barrell knocked upon with the finger, giveth a *Diapason* to the Sound of the like Barrell full; But how that should be I do not well understand; For that the knocking of a Barrell full or Empty, doth scarce give any Tone.

There is required some sensible difference in the Proportion of creating a Note, towards the Sound it selfe, which is the Passive: and that it be not too near but at a distance. For in a Recorder, the three uppermost Holes, yield one Tone; which is a Note lower than the Tone of the first three. And the like (no doubt) is required in the winding or stopping of Strings.

There is another Difference of Sounds, which we will call *Exteriour* and *Interior*. It is not Soft nor Loud: nor it is not Base, nor Treble: Nor it is not Muscally, nor Immuscally: Though it be true, that there can be no Tone in an Interior Sound, But on the other side, in an Exterior Sound, there may be both Muscally and Immuscally: We shall therefore enumerate them, rather than precisely distinguish them; Though to make some adumbration of that we mean) the Interior is rather an Impulsion or Confusion of the Aire, than an Elision or Section of the same, so as the Percussion of the one towards the other, differeth, as a Blow differeth from a Cut.

In Speech of Man, the Whispering, (which they call *Susurrus* in Latine,) whether it be louder or softer, is an Interior Sound; But the Speaking out, is an Exterior Sound; And therefore you can never make a Tone, nor sing in Whispering; But in Speech you may: So Breathing, or Blowing by the Mouth, Bellowses, or Wind, (though loud) is an Interior Sound; But the Blowing thorough a Pipe, or Concave (though soft) is an Exterior, so likewise the greatest Winds, if they have no Coarctation, or blow not hollow, give any Interior Sound; the Whistling or hollow Wind yieldeth a singing, or Exterior Sound; the former being pent by some other Body; The latter being pent in by his own Density: And therefore we see, that when the Wind bloweth hollow it is a sign of Rain, The Flame, as it moveth within it selfe, or is blown by a Bellowses, giveth a Murmur or Interior Sound.

There is no Hard Body, but struck against another Hard Body, will yield an Exterior Sound, greater or lesser: In so much as if the Percussion be over-soft, it may induce a Nullity of Sound; but never an Interior Sound; as when one treadeth so softly that he is not heard.

Where the Air is the Percutient, pent or not pent, against a Hard Body, it never giveth an Exterior Sound; as if you blow strongly with a Bellowses against a Wall.

Sounds (both Exterior and Interior) may be made, as well by suction, as by emission of the Breath; as in Whistling or Breathing.

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Experiments
in Consonance
touching Exter-
iour, and Inter-
iour Sounds.

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Experiments
in Confort
touching A-
rticulations of
sounds.

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IT is evident, and it is one of the strangest secrets in *Sounds*; that the *whole Sound* is not in the *whole Air* only; but the *whole Sound* is also in every *small Part* of the *Air*. So that all the curious Diversity of *Articulate Sounds* of the Voice of Man, or Birds, will enter into a *small Crany*, Inconfused.

The *Unequall Agitation* of the *Winds*, and the like, though they be material to the carriage of the *Sounds*, further or lesse way; yet they do not confound the *Articulation* of them at all, within that distance that they can be heard; Though it may be, they make them to be heard lesse Way, than in a still, as hath been partly touched.

Over-great distance confoundeth the *Articulation* of *Sounds*; as we see, that you may hear the *Sound* of a *Preachers Voice*, or the like, when you cannot distinguish what he saith. And one *Articulate Sound* will confound another as when many speak at once.

In the *Experiment* of *speaking under Water*, when the Voice is reduced to such an *Extreme Exhility*, yet the *Articulate Sounds*, (which are the *Words*) are not confounded, as hath been said.

I conceive, that an *Extreme small*, or an *Extreme great Sound*, cannot be *Articulate*; But that the *Articulation* requireth a *Mediocrity* of *Sound*: For that the *Extreme small Sound* confoundeth the *Articulation* by *Contracting*; And the *Great Sound* by *dispersing*: And although (as was formerly said) a *Sound Articulate*, already created, will be contracted into a *small Crany*; yet the *first Articulation* requireth more *Dimension*.

It hath been observed, that in a *Room*, or in a *Chappel*, Vaulted below, and Vaulted likewise in the *Roofe*, a *Preacher* cannot be heard so well, as in the like places not so Vaulted. The Cause is, for that the *Subsequent Words* come on, before the *Precedent Words* vanish; and therefore the *Articulate Sounds* are more confused, though the *Gross* of the *Sound* be greater.

The *Motions* of the *Tongue*, *Lips*, *Throat*, *Palate*, &c. which go to the *Making* of the severall *Alphabetical Letters* are worthy Enquiry, and pertinent to the present *Inquisition* of *Sounds*: But because they are subtil and long to describe, we will referre them over, and place them amongst the *Experiments* of *Speech*. The *Hebrews* have been dilligent in it, and have assigned, which *Letters* are *Labiall*, which *Dental*, which *Gutturall*, &c. As for the *Latines* and *Grecians*, they have distinguished between *Semi-vowels* and *Mutes*; and in *Mutes*, between *Mute Tenues*, *Media*, and *Aspirate*; Not amiss, but yet not dilligently enough. For the speciall *Strokes*, and *Motions*, that create those *Sounds*, they have little enquired: As that the *Letters*, *B*, *P*, *F*, *M*, are not expressed, but with the *Contracting*, or *Shutting* of the *Mouth*; That the *Letters* *N*, and *B*, cannot be pronounced, but that the *Letter* *N*, will turn into *M*: as *Hecatonba* will be *Hecatomba*. That *M*, and *T*, cannot be pronounced together; but *P*, will come between; as *Emphus*, is pronounced *Emphus*; and a number of the like: so that if you enquire to the full; you will finde, that to the making of the whole *Alphabet* there will be fewer *simple Motions* required, than there are *Letters*.

The *Lungs* are the most spongy Part of the *Body*; and therefore ablest to contract and dilate it selfe; and where it contracteth it selfe, it expelleth the *Air*; which thorow the *Artire*, *Throat*, and *Mouth*, maketh the *Voice*: But yet *Articulation* is not made, but with the

the help of the *Tongue, Palat,* and the rest of those they call *Instruments* of *Voice.*

There is found a Similitude between the *Sound* that is made by *Inanimate Bodies,* or by *Animate Bodies,* that have no *Voice Articulate;* and divers *Letters* of *Articulate Voices:* And commonly Men have given such Names to those *Sounds,* as do allude unto the *Articulate Letters.* As *Trembling of Water* hath Resemblance with the *Letter L.* *Quenching of Hot Metalls,* with the *Letter Z.* *Snarling of Dogs* with the *Letter R.* The

Noise of *Scritch-Owls,* with the *Letters Sh.* *Voice of Cats,* with the *Diphthong Eu.* *Voice of Chuckoes,* with the *Diphthong Ou.* *Sounds of Strings,*

with the *Letters Ng.* So that if a Man, (for Curiosity, or Strangeness sake,) would make a *Puppet* or other *Dead Body,* to pronounce a *Word;* Let him consider, on the one Part,

the Motion of the *Instruments* of *Voice;* and on

the other Part the like *Sounds* made in *Inanimate Bodies;* And what Conformity

there is that causeth the Similitude of *Sounds;* And by that

he may minister light
to that Effect.

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NATURAL



NATURAL HISTORY.

III. Century



ALL Sounds (whatsoever) move Round, That is to say, On all sides, Upwards, Downwards, Forewards, and Backwards; This appeareth in all Instances.

Sounds do not require to be conveyed to the Sense, in a Right Line, as Visibles do, but may be Arched; Though it be true they move strongest in a Right Line; Which nevertheless is not caused by the Rightness of the Line but by the shortness of the distance; *Linearis est brevissima*, and therefore we see, if a Wall be between, and you speak on the own side, you hear it on the other; Which is not because the Sound passeth thorow the Wall, but Arched over the Wall.

If the Sound be stoped and Repercussed, it cometh about on the other side: in an Oblique Line. So, if in a Coach, on side of the boot be down, and the other up; And a Begger beg on the Close side; you would think that he were on the Open side. So likewise, if a Bell or Clock, be (for Example) on the North side of a Chamber; And the Window of that Chamber be upon the South; he that is in the Chamber will think the Sound came from the South.

Sounds, though they spread round, so that (there is an Orbe, or Spherical Area of the Sound;) yet they move strongest, and go furthest in the Fore-Lines, from the first Local Impulsion of the Aire. And therefore in Preaching, you shall hear the Preachers Voice better before the Pulpit than behind it, or on the sides though it stand open. So a Harquebuz or Ordnance, will be further heard forwards, from the Mouth of the Peece, than backwards, or on the sides.

It may be doubted, that Sounds do move better Downwards, than Upwards. Pulpits are placed high above the people. And when the Ancient Generals spake to their Armies, they had ever a Mount of Turfe cast up, where upon they stood: But this may be imputed to the stops and Obstacles which the voice meeteth with, when one speaketh upon the level. But

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Experiments
in Confort
touching the
Motions of
Sounds, in
what Lines
they are
Circular, Ob-
lique, Straight;
Upwards,
Downwards;
Forwards,
Backwards.

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there seemeth to be more in it: For it may be, that *spiritual species*, both of *Things Visible*, and *Sounds* do move better *Downwards* than *Upwards*. It is a strange thing, that to Men standing below on the Ground, those that be on the Top of Pauls, seem much less than they are, and cannot be known; But to men above those below seem nothing so much lessened, and may be known: yet it is true, that all things to them above, seem also somewhat contracted and better collected into figure: as *Knots in Gardens* shew best from an upper Window or Tarras.

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But to make an exact Triall of it let a man stand in a *Chamber*, not much above the Ground, and speak out at the Window, thorow a *Trunk*, to one standing on the Ground as softly as he can, the other laying his Ear close to the *Trunk*: Then *via versa*, let the other speak below keeping the same Proportion of Softness; And let him in the *Chamber* lay his Ear to the *Trunk* And this may be the aptest Meanes, to make a Judgement, whether *Sounds* descend or ascend better.

Experiments
in Consonance
touching the
Lasting and
Fading of
Sounds; And
touching the
Time they re-
quire to the
Generation, or
Dilation.

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After that *Sound* is created, (which is in a moment) we find it continueth some small time, melting by little and little. In this there is a wonderfull Errour amongst Men, who take this to be a *Continuance* of the *First Sound*; whereas (in truth) it is a *Renovation*, and not a *Continuance*: For the *Body percussed*, hath by reason of the *Percussion*, a *Trepidation* wrought in the *Minute Parts*; and so reneweth the *Percussion* of the *Air*. This appeareth manifestly, because that the Melting *Sound* of a Bell, or of a string stricken which is thought to be a *Continuance*, ceaseth as soon as the Bell or string are touched. As in a *Virginal*, as soon as ever the Jack falleth, and toucheth the string, the *Sound* ceaseth; and in a Bell, after you have chimed upon it, if you touch the Bell, the *Sound* ceaseth. And in this you must distinguish that there are two *Trepidations*; the one manifest and Local; as of the Bell, when it is *Pensile*: the other secret, of the *Minute Parts* such as is described in the ninth Instance. But it is true, that the *Local* helpeth the *Secret* greatly. We see likewise that in Pipes, and other wind Instruments, the *Sound* lasteth no longer, than the breath bloweth. It is true that in Organs, there is a confused Murmur for a while, after you have played But that is but while the Bellows are in falling.

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It is certain, that in the *Noise* of great *Ordnance*, where many are shot off together the *Sound* will be carried, (at the least) twenty Miles upon the Land and much further upon the Water But then it will come to the Ear; Not in the Instant of the shooting off, but it will come an hour, or more later this must needs be a *Continuance* of the *first Sound*; For there is no *Trepidation* which should renew it. And the touching of the *Ordnance* would not extinguish the *Sound* the sooner: So that in great *Sounds* the *Continuance* is more than Momentary.

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To try exactly the time wherein *Sound* is *Delated*, let a Man stand in a Steeple and have with him a Taper; and let some veil be put before the Taper; and let another Man stand in the Field a mile off. Then let him in the steeple strike the Bell; and in the same instant withdraw the Veile; And so let him in the Field tell by his Pulse what distance of Time there is between the *Light seen* and the *Sound heard*: For it is certain that the *Dilation* of *Light* is in an Instant. This may be tried in far greater Distances, allowing greater *Lights* and *Sounds*.

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It is generally known and observed, that *Light* and the *Object* of sight, move swifter than *Sound*; For we see the *Flash* of a *Peece* is seen sooner, than

than the *Noise* is heard. And in Hewing Wood, if one be some distance off, he shall see the *Arme* lifted up for a second stroke, before he hear the *Noise* of the first. And the greater the Distance, the greater is the Prevention: As we see in Thunder, which is far off; Where the Lightning precedeth the Crack a good space.

Colours, when they represent themselves to the *Eie*, fade not nor melt not by degrees, but appear still in the same strength; But *Sounds* melt, and vanish, by little and little. The Cause is, for that *Colours* participate nothing with the *Motion* of the *Air*, but *Sounds* do. And it is a plain Argument that *Sound* participateth of some *Locall Motion*, of the *Air*, (as a Cause *Sine qua non*), in that, it perisheth so suddely; For in every Section; or Impulsion of the *Air*, the *Air* doth suddenly restore and reunite it self, which the *Water* also doth, but nothing so swiftly.

In the Trials of the *Passage*, or *Not Passage* of *Sounds*; you must take heed, you mistake not the *Passing by the sides* of a *Body*, for the *Passing thorow* a *Body*: and therefore you must make the *Intercepting Body* very close; For *Sound* will pass thorow a small Chinck.

Experiments
in Confort
touching the
Passage and
Interceptions
of *Sounds*.

Where *Sound* passeth thorow a *Hard*, or *Close Body* (as thorow *Water*, thorow a *Wall*, thorow *Metall*, as in Hawks Bels stopped, &c.) the *Hard* or *Close Body*, must be but thinne and small; For else it deadeth and extinguisheth the *Sound* utterly. And therefore, in the *Experiment* of *Speaking in Air under Water*, the *Voice* must not be very deep within the *Water*: For then the *Sound* pierceth not. So if you speak on the further side of a *Close Wall*, if the *Wall* be very thick, you shall not be heard: And if there were an *Hoghead* empty; whereof the sides were some two Foot thick, and the Bung-hole stopped: I conceive the *Resounding Sound*, by the *Communication*, of the *Outward Air* with the *Air within*, would be little or none: but only you shall hear the *Noise* of the *Outward Knock*, as if the *Vessell* were full.

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It is certain, that in the *Passage* of *Sounds* thorow *Hard Bodies*, the *Spirit* or *Pneumaticall Part* of the *Hard Body* it self, doth Co-operate; But much better, when the sides of that *Hard Body* are struck, than when the *Percussion* is only within, without *Touch* of the sides. Take therefore a Hawks Bell, the holes stopped up, and hang it by a thread, within a Bottle Glas; and stop the Mouth of the Glas, very close with Wax, and then shake the Glas, and see whether the Bell give any *Sound* at all, or how weak? But note, that you must instead of the Thread, take a Wire; or else let the Glas have a great Belly; lest when you shake the Bell it dash upon the sides of the Glas.

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It is plain, that a very *Long*, and *Down-right Arch*, for the *Sound* to pass, will extinguish the *Sound* quiet; so that that *Sound*, which would be heard over a *Wall*, will not be heard over a *Church*; Nor that *Sound*, which will be heard, if you stand some distance from the *Wall*, will be heard if you stand close under the *Wall*.

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Soft and *Foraminous Bodies*, in the first *Creation* of the *Sound*, will dead it; For the striking against Cloth, or Furre, will make little *Sounds*; as hath been said: But in the *Passage* of the *Sound*, they will admit it better than *Harder Bodies*; as we see, that Curtaines, and Hangings, will not stay the *Sound* much; But Glas-windowes, if they be very Close, will check a

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sound more, than the like thickness of Cloth. We see also, in the rumbling of the Belly, how easily the sound passeth thorow the Guts, and Skin.

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It is worthy the Enquiry, whether *Great Sounds*, (as of Ordnance, or Bells) become not more *Weak and Exile*, when they pass thorow *Small Cranies*. For the *Subtilties of Articulate Sounds*, (it may be) may pass thorow *Small Cranies*, not confused; But the *Magnitude of the Sound* (perhaps,) not so well.

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Experiments
in Confort
touching the
Medium of
Sounds.

The *Mediums of Sounds* are *Air*, *Soft and Porous Bodies*; also *Water*, and *Hard Bodies* refuse not altogether to be *Mediums of Sounds*. But all of them are dull and unapt *Differents*, except the *Air*.

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In *Air*, the *Thinner or Drier Air*, carrieth not the *Sound* so well, as the more *Dense*; as appeareth in *Night Sounds*; and *Evening Sounds*, and *Sounds* in moist Weather, and *Southern Winds*. The reason is already mentioned in the Title of *Majoration of Sounds*; Being, for that *Thin Air* is better pierced; but *Thick Air* preserveth the *Sound* better from Wast; Let further Triall be made by *Hollowing in Mists*, and *Gentle Showers*: For (it may be) that will somewhat dead the *Sound*.

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How far forth *Flame* may be a *Medium of Sounds*, (especially of such *Sounds* as are created by *Air*, and not betwixt *Hard Bodies*) let it be tried, in *Speaking*, where a *Bonfire* is between; But then you must allow for some disturbance, the *Noise* that the *Flame* it self maketh.

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Whether any other *Liquours*, being made *Mediums*, cause a diversity of *Sound* from *Water*, it may be tried: As by the *Knapping of the Tong*; Or *striking the Bottome of a Vessell* filled, either with *Milk*, or with *Oil*; which though they be more light, yet are they more unequall *Bodies* than *Air*.

Of the *Natures of the Mediums*, we have now spoken; As for the *Disposition of the said Mediums*, it doth consist in the *Penning*, or not *Penning* of the *Air*; Of which we have spoken before, in the Title of *Delation of Sounds*: It consisteth also in the *Figure of the Concave*, through which it passeth; Of which we will speak next.

Experiments
in Confort
what the *Fi-
gures of the
Pipes or Cor-
caves or the
Bodies different*
conduce to the
Sounds.

How the *Figures of Pipes*, or *Concaves*, through which *Sounds* pass; Or of other *Bodies different*: Conduce to the variety and *Alteration of the Sounds*: Either in respect of the *Greater Quantity*, or *less Quantity* of *Air*, which the *Concaves* receive; Or in respect of the *Carrying of Sounds* longer or shorter way; Or in respect of many other *Circumstances*, they have been touched, as falling into other *Titles*. But those *Figures*, which we now are to speak of, we intend to be, as they concern the *Lines*, through which *Sound* passeth; As *Straight*, *Crooked*, *Angular*, *Circular*, &c.

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The *Figure of a Bell* partaketh of the *Pyramid*, but yet coming off, and dilating more suddenly. The *Figure of a Hunters Horne*, and *Cornet*, is oblique; yet they have likewise *Straight Hornes*; which if they be of the same Bore with the *Oblique*, differ little in *Sound*: save that the *Straight* require somewhat a stronger *Blast*. The *Figure of Recorders*, and *Flutes*, and *Pipes*, are *Straight*; But the *Recorder* hath a lesse Bore, and a greater; above, and below. The *Trumpet* hath the *Figure of the Letter S*. which maketh that

Purling

Purling Sound, &c. Generally, the *Straight Line* hath the cleaneſt and roundeſt Sound and the *Crooked* the more *Hoarſe*, and Jarring.

Of a *Sinuous Pipe*, that may have ſome four Flexions, Triall would be made. Likewise of a *Pipe*, made like a *Croſs*, open in the middeſt. And ſo likewise of an *Angular Pipe*: And ſee what will be the Effects of theſe ſeverall Sounds. And ſo again of a *Circular Pipe*; as if you take a *Pipe* perfect Round, and make a Hole whereinto you ſhall blow; and another Hole not far from that; But with a *Traverse* or *Stop* between them; ſo that your *Breath* may go the Round of the *Circle*, and come forth at the ſecond Hole. You may trie likewise *Percuſſions* of *Solid Bodies* of ſeverall Figures; As *Globes*, *Flats*, *Cubes*, *Croſſes*, *Triangles*, &c. And their *Combinations*; As *Flat* againſt *Flat*: And *Convex* againſt *Convex*: And *Convex* againſt *Flat*, &c. And mark well the diverſities of the Sounds. Try alſo the difference in Sound of ſeverall *Craſſitudes* of *Hard Bodies* percuffed: And take knowledge of the diverſities of the Sounds. I my ſelf have tried, that a *Ell* of *Gold* yieldeth an excellent Sound, not inferior to that of *Silver*, or *Brass*, but rather better: Yet we ſee that a piece of *Money* of *Gold* ſoundeth far more flat than a piece of *Money* of *Silver*.

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The *Harp* hath the *Concave*, not along the *strings*, but acroſs the *strings*; and no *Instrument* hath the Sound ſo Melting, and Prolonged, as the *Iriſh Harp*. So as I ſuppoſe, that if a *Virginal* were made with a double *Concave*; the one all the length as the *Virginal* hath; the other at the End of the *strings*, as the *Harp* hath; it muſt needs make the Sound perfecter, and not ſo ſhallow, and Jarring. You may trie it, without any Sound-Board along, but only *Harp*-wiſe, at one End of the *strings*: Or laſtly with a double *Concave*, at Each end of the *strings* one.

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There is an apparent diverſity between the *Species Viſible*, and *Andible*, in this: That the *Viſible* doth not mingle in the *Medium*, but the *Andible* doth. For if we look abroad, we ſee Heaven, a number of Stars, Trees, Hills, Men, Beaſts, at once. And the *Species* of the one doth not confound the other. But if ſo many Sounds come from ſeverall Parts, one of them would utterly confound the other. So we ſee, that *Voices* or *Conſorts* of *Muſick* do make a *Harmony* by *Mixture*, which *Colours* do not. It is true nevertheleſs, that a great *Light* drowneth a ſmaller, that it cannot be ſeen; as the *Sun* that of a *Glowworm*; as well as a Great Sound drowneth a Leſſer. And I ſuppoſe likewise, that if there were two *Lanthorns* of *Glaſs*, the one a *Crimſin*, and the other an *Azure*, and a *Candle* within either of them, thoſe Coloured Lights would mingle and caſt upon a *White Paper* a *Purple Colour*. And even in *Colours*, they yield a faint and weak *Mixture*: For white walls make *Rooms* more lightsome than black, &c. But the *Cauſe*, of the *Confuſion* in Sounds, and the *Inconfuſion* in *Species Viſible*; is, For that the *Sight* worketh in *Right Lines*, and maketh ſeverall *Cones*; and ſo there can be no *Coincidence* in the *Eie*, or *Viſuall Point*: But Sounds that move in *Oblique* and *Arcuate Lines*, muſt needs encounter; and diſturb the one the other.

Experiments
in Conſort
touching the
Mixture of
Sounds.

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The ſweeteſt and beſt *Harmony* is, when every *Part* or *Instrument*, is not heard by it ſelf, but a *Conſolation* of them all; Which requireth to ſtand ſome diſtance off. Even as it is in the *Mixture* of *Perfumes*; Or the taking of the Smells of ſeverall *Flowers* in the *Air*.

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The *Diſpoſition* of the *Air*, in other *Qualities*, except it be joyned with Sound, hath no great Operation upon sounds: For whether the *Air* be

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lightsome or dark, hot or cold, quiet or stirring, (except it be with *Noise*) sweet-smelling, or stinking, or the like; it importeth not much: Some petty alteration or difference it may make.

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But *Sounds* do disturb and altar the one the other: Sometimes the one drowning the other, and making it not heard; sometimes the one jarring and discording with the other, and making a Confusion; sometimes the one mingling and compounding with the other, and making an Harmony.

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Two *Voices* of like loudness, will not be heard twice as far, as one of them alone; And two *Candles* of like light, will not make things seem twice as far off, as one. The Cause is profound; But it seemeth that the *Impressions*, from the *Objects* of the *Senses*, do mingle respectively, every one with his kind; But not in proportion, as is before demonstrated: And the reason may be, because the first *Impression*, which is from *Privative* to *Active* (As from *Silence* to *Noise*, or from *Darkness* to *Light*,) is a greater Degree, than from *Less Noise*, to *More Noise*, or from *Less Light*, to *More Light*. And the Reason of that again may be; For that the *Air*, after it hath received a Charge, doth not receive a Surcharge, or greater Charge, with like Appetite, as it doth the first Charge. As for the Encrease of Vertue generally, what Proportion it beareth to the Encrease of the Matter, it is a large Field, and to be handled by it self.

Experiments
in Consonance
touching Me-
lioration Of
Sounds.

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ALL *Reflexions* Concurrent, do make *Sounds* Greater; But if the Body that createth, either the Originall *Sound*, or the *Reflexion*, be clean and smooth, it maketh them sweeter. Triall may be made of a *Lute*, or *Vial*, with the Belly of polished Brass in stead of Wood. We see that even in the open Air, the *Wire string* is sweeter, than the *string* of *Guts*. And we see that for *Reflexion*, *Water* excelleth; as in *Musick* near the *Water*; or in *Eccho's*.

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It hath been tried, that a *Pipe*, a little moistned on the inside, but yet so as there be no drops left, maketh a more solemn *Sound*, than if the *Pipe* were dry: But yet with a sweet degree of *Sibilation*, or *Purling*; As we touched it before in the title of *Equality*. The Cause is, for that all Things Porous, being superficially wet, and (as it were) between dry, and wet, become a little more even and smooth; But the *Purling* (which must needs proceed of *Inequality*,) I take to be bred between the smoothness of the inward Surface of the *Pipe*, which is wet, and the Rest of the Wood of the *Pipe*, unto which the wet cometh not, but it remaineth dry.

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In *Frosty Weather*, *Musick* within doors soundeth better. Which may be, by reason, not of the Disposition of the *Air*, but of the *Wood* or *string* of the *Instrument*, which is made more Crispe, and so more porous and hollow: And we see that *Old Lutes* sound better than *New*, for the same reason. And so do *Lute strings* that have been kept long.

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Sound is likewise *Meliorated* by the *Mingling* of Open Air with Pent Air; Therefore Triall may be made, of a *Lute* or *Viall* with a double Belly; Making another Belly with a Knot over the strings; yet so, as there be Room enough for the strings, and Room enough to play below that Belly. Triall may be also made of an *Irish Harp*, with a Concave on both sides; whereas it useth to have it but on one side. The doubt may be, lest it should make too much Resounding; whereby one Note would overtake another.

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If you sing in the Hole of a *Drum*, it maketh the *Singing* more sweet. And so I conceive it would, if it were a *Song* in *Parts*, sung into severall *Drums*; and for handfomeness and strangeness sake, it would not be amiss to have a Curtain between the Place, where the *Drums* are, and the Hearers.

When

When a Sound is created in a *Wind-Instrument*, between the *Breath* and *Air*, yet if the *Sound* be communicate with a more equall *Body* of the *Pipe*, it *meliorateth* the *Sound*. For (no doubt) there would be a differing *Sound* in a *Trumpet*, or *Pipe* of *Wood*; and again in a *Trumpet* or *Pipe* of *Brass*. It were good to try *Recorders* and *Hunters Horns* of *Brass*, what the *Sound* would be.

Sounds are *meliorated* by the *Intension* of the *Sense*, where the *Common Sense* is collected most, to the particular *Sense* of *Hearing*, and the *Sight* suspended: And therefore, *Sounds* are sweeter, (as well as greater,) in the *Night*, than in the *Day*, and I suppose, they are sweeter to blind *Men*, than to *Others*: And it is manifest, that between *Sleeping* and *Waking*, (when all the *senses* are bound and suspended) *Musick* is far sweeter, than when one is fully *waking*.

IT is a Thing strange in Nature, when it is attentively considered; How *Children*, and some *Birds* learn to *Imitate Speech*. They take no Mark (at all) of the *Motion* of the *Mouth* of Him that speaketh; For *Birds*, are as well taught in the *Dark*, as by *Light*. The *Sounds* of *Speech* are very *Curious* and *Exquisite*: So one would think it were a *Lesson* hard to learn. It is true, that it is done with time, and by little and little, and with many *effays* and *Proffers*: But all this dischargeth not the *Wonder*. It would make a *Man* think (though this which we shall say may seem exceeding strange) that there is some *Transmission* of *Spirits*; and that the *Spirit* of the *Teacher* put in *Motion*, should work with the *Spirits* of the *Learner*, a *Pre-disposition* to offer to *Imitate*; and so to perfect the *Imitation* by degrees. But touching *Operations* by *Transmissions* of *Spirits*, (which is one of the highest secrets in Nature,) we shall speak in due place; Chiefly when we come to enquire of *Imagination*. But as for *Imitation*, it is certain, that there is in *Men*, and other *Creatures*, a *Pre-disposition* to *Imitate*. We see how ready *Apes* and *Monkeys* are, to *Imitate* all *Motions* of *Man*: And in the *Catching* of *Dot-trells*, we see, how the *Foolish Bird* playeth the *Ape* in *Gestures*: And no *Man* (in effect) doth accompany with others, but he learneth (ere he is aware,) some *Gesture*, or *Voice*, or *Fashion* of the other.

In *Imitation* of *Sounds*, that *Man* should be the *Teacher*, is no Part of the *Matter*; For *Birds* will learn one of another; and there is no *Reward*, by feeding, or the like, given them for the *Imitation*; and besides, you shall have *Parrets*, that will not only *Imitate* *Voices*, but *Laughing*, *Knocking*, *Squeaking* of a *Doore* upon the *Hinges*, or of a *Cart-wheele*; and (in effect) any other *Noise* they hear.

No *Beast* can *Imitate* the *speech* of *Man*, but *Birds* only; For the *Ape* it self, that is so ready to *Imitate* otherwise, attaineth not any degree of *Imitation* of *Speech*. It is true, that I have known a *Dog*, that if one howled in his Ear, he would fall a howling a great while. What should be the aptness of *Birds*, in comparison of *Beasts*, to *Imitate* the *Speech* of *Man*, may be further enquired. We see that *Beasts* have those *Parts*, which they count the *Instruments* of *Speech*, (as *Lips*, *Teeth*, &c.) liker unto *Man*, than *Birds*. As for the *Neck*, By which the *Throat* passeth; we see many *Beasts* have it, for the *Length*, as much as *Birds*. What better *Gorge*, or *Attire*, *Birds* have, may be further enquired. The *Birds* that are known to be *Speakers*, are, *Parrets*, *Pyes*, *Jays*, *Dawes*, and *Ravens*. Of which *Parrets* have an adunque *Bill*, but the rest not.

But I conceive, that the *Aptness* of *Birds*, is not so much in the *Conformity* of the *Organs* of *Speech*, as in their *Attention*. For *Speech* must come by

Experiments
in Confort
touching the
Imitation of
Sounds

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Hearing

Hearing, and Learning; and *Birds* give more heed, and mark *Sounds*, more than *Beasts*; because naturally they are more delighted with them, and practise them more; as appeareth in their *Singing*. We see also, that those that teach *Birds* to sing, do keep them waking, to increase their *Attention*. We see also, that *Cock-Birds*, amongst *Singing-Birds*, are ever the better *Singers*; which may be, because they are more lively, and listen more.

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Labour, and *Intention* to imitate *Voices*, doth conduce much to *Imitation*: And therefore we see, that there be certain *Pantomimi*, that will represent the voices of *Players of Interludes*, so to life, as if you see them not, you would think they were those *Players* themselves; and so the *Voices* of other *Men* that they hear.

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There have been some, that could counterfeit the *Distance of Voices*, (which is a *Secondary Object of Hearing*) in such sort; as when they stand fast by you, you would think the *Speech* came from a far off, in a fearfull manner. How this is done, may be further enquired. But I see no great use of it, but for *Imposture*, in counterfeiting *Ghosts* or *Spirits*.

Experiments
in Confort
touching the
Reflexion of
Sunds.

There be three Kinds of *Reflexions of Sounds*; a *Reflexion Concurrent*; a *Reflexion Iterant* which we call *Eccho*; and a *Super-reflexion*, or an *Eccho* of an *Eccho*, whereof the first hath been handled in the *Title of Magnitude of Sounds*: The Latter two we will now speak of.

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The *Reflexion of Species Visible*, by *Mirrors*, you may command; Because passing in *Right Lines*, they may be guided to any point: But the *Reflexion of Sounds* is hard to master; Because the *Sound* filling great *Spaces* in *Arched Lines*, cannot be so guided: And therefore we see there hath not been practised, any *Meanes* to make *Artificiall Eccho's*. And no *Eccho* already known returneth in a very narrow *Room*.

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The *Natural Eccho's* are made upon *Walls*, *Woods*, *Rocks*, *Hills*, and *Bancks*; As for *Waters*, being near, they make a *Concurrent Eccho*; but being further off, (as upon a large *River*) they make an *Iterant Eccho*: For there is no difference between the *Concurrent Eccho*, and the *Iterant*, but the quickness, or slowness of the *Return*. But there is no doubt, but water doth help the *Delation of Eccho*; as well as it helpeth the *Delation of Originall Sounds*.

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It is certain, (as hath been formerly touched,) that if you speak thorow a *Trunk*, stopped at the further end; you shall find a *Blast* return upon your *Mouth*, but no *Sound* at all. The *Cause* is, for that the *Closeness*, which preserveth the *Originall*, is not able to preserve the *Reflected Sound*: Besides that *Eccho's* are seldome created, but by loud *Sounds*. And therefore there is less hope of *Artificiall Eccho's* in *Air*, pent in a narrow *Concave*. Nevertheless it hath been tried, that one leaning over a *Well*, of 55 *Fathoms* deep, and speaking, though but softly, (yet not so soft as a whisper,) the *Water* returned a good *Audible Eccho*. It would be tried, whether speaking in *Caves*, where there is no *Issue*, save where you speak, will not yield *Eccho's*, as *Wells* do.

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The *Eccho* cometh as the *Originall Sound* doth, in a round *Orb of Air*: It were good to try the creating of the *Eccho*, where the *Body Repercussing* maketh an *Angle*: As against the *Return of a Wall*, &c. Also we see that in *Mirrors*, there is the like *Angle of Incidence*, from the *Object* to the *Glass*, and from the *Glass* to the *Eie*. And if you strike a *Ball* side-long, not full upon the *Surface*, the rebound will be as much the contrary way; whether

ther there be any such *Resilience* in *Eccho's*, (that is, whether a man shall hear better, if he stand aside the Body *Repercussing*, than if he stand where he speaketh, or any where in a right Line between;) may be tried, *Triall* like. wife would be made, by standing nearer the place of *Repercussing*, than he that speaketh; and again by standing further off, than he that speaketh and so knowledge would be taken, whether *Eccho's*, as well as *Criginall Sounds* be not strongest near hand.

There be many Places, where you shall hear a number of *Eccho's* one after another: And it is, when there is Variety of *Hills* or *Woods*, some nearer some further off: So that the Return, from the further, being last created, will be likewise last heard.

As the *Voice* goeth round, as well towards the Back, as towards the Front of him that speaketh: So likewise doth the *Eccho*; For you have many Back-*Eccho's* to the Place where you stand.

To make an *Eccho*, that will report, three, or four, or five Words, distinctly, it is requisite, that the Body *Repercussing*, be a good distance off: For if it be near, and yet not so near, as to make a *Concurrent Eccho*, it choppeth with you upon the sudden. It is requisite likewise, that the *Air* be not much *pent*. For *Air*, at great distance, *pent*, worketh the same effect with *Air* at large, in a small distance. And therefore in the *Triall* of *Speaking in the Well*, though the well was deep, the *Voice* came back, suddenly; and would bear the Report but of two Words.

For *Eccho's* upon *Eccho's*, there is a rare instance thereof in a Place, which I will now exactly describe. It is some three, or four Miles from *Paris*, near a Town called *Pont-Carenton*; and some Bird-bolt shot, or more, from the River of *Seane*. The Roome is a *Chappell*, or small Church. The Walls all standing, both at the Sides, and at the Ends. Two rows of Pillars, after the manner of *Isles* of Churches, also standing; The Roof all open, not so much as any Embowment near any of the Walls left. There was against every Pillar, a stack of *Billets*, above a Mans Height; which the Watermen, that bring Wood down the *Seane*, in stacks, and not in Boats, laid there (as it seemeth) for their ease. Speaking at the one End, I did hear it return the Voice thirteen severall times; and I have heard of others, that it would return sixteen times: For I was there about three of the Clock in the afternoon: And it is best, (as all other *Eccho's* are) in the Evening. It is manifest, that it is not *Eccho's* from severall places, but a *Tossing* of the *Voice*, as a Ball, too and fro; Like to *Reflexions* in *Looking glasses*; where if you place one *Glass* before, and another behind, you shall see the *Glass* behind with the *Image*, within the *Glass* before; and again, the *Glass* before in that; and divers such *Super-Reflexions*, till the *species speciei* at last die. For it is every Return weaker, and more shady. In like manner, the *Voice* in that *Chappell*, createth *speciem speciei*, and maketh succeeding *Super-Reflexions*; For it melteth by degrees, and every *Reflexion* is weaker than the former: So that, if you speak three words, it will (perhaps) some three times report you the whole three words; and then the two latter words for sometimes; and then the last word alone for sometimes; still fading, and growing weaker. And whereas in *Eccho's* of one Return, it is much to hear four or five words; In this *Eccho* of so many Returnes, upon the matter, you hear above twenty words for three.

The like *Eccho* upon *Eccho*, but onely with two Reports, hath been observed, to be, if you stand between a *House*, and a *Hill*, and lure towards the

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Hill

Hill. For the *Houſe* will give a *Back Eccho*; One taking it from the other, and the latter the weaker.

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There are certain *Letters*, that an *Eccho* will hardly expreſs; As *S*, for one, Eſpecially being Principall in a Word. I remember well, that when I went to the *Eccho* at *Pont-Careſton*, there was an *Old Pariſian*, that took it to be the Work of Spirits, and of good Spirits. For, (ſaid he) call *Satan*, and the *Eccho* will not deliver back the Devils name; But will ſay, *Vat'en*; Which is as much in *French*, as *Apage*, or *Avoid*. And thereby I did hap to find, that an *Eccho* would not return *S*, being but a Hiſſing and an *Interior Sound*.

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Eccho's are ſome more ſudden, and chop again, as ſoone as the *Voice* is delivered; as hath been partly ſaid: Others are more deliberate, that is, give more ſpace between the *Voice*, and the *Eccho*; which is cauſed by the local Nearnels, or Diſtance: Some will report a longer Train of Words; And ſome a ſhorter: Some more loud (full as loud as the *Originall*, and ſometimes more loud;) and ſome weaker and fainter.

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Where *Eccho's* come from ſeverall Parts, at the ſame diſtance they muſt needs make (as it were) a Quire of *Eccho's*, and ſo make the Report greater, and even a *Continued Eccho*; which you ſhall find in ſome *Hills*, that ſtand encompassed, Theatre-like.

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It doth not yet appear, that there is *Refractiion* in *Sounds*, as well as in *Species Viſible*. For I do not think, that if a *Sound* ſhould paſs through divers *Mediums*, as *Air*, *Cloth*, *Wood*;) it would deliver the *Sound*, in a differing Place, from that unto which it is deferred; which is the Proper Effect of *Refractiion*. But *Majoration*, which is alſo the Work of *Refractiion*, appeareth plainly in *Sounds*, (as hath been handled at full;) But it is not by Diverſity of *Mediums*.

Experiments
in Conſort
touching the
Conſent and
Diſſent be-
tween *Viſibles*
and *Audibles*.

We have *Obiter*, for *Demonſtrations* ſake, uſed in divers *Instances*, the *Examples* of the *Sight*, and *Things Viſible*, to illuſtrate the *Nature* of *Sounds*. But we think good now to proſecute that *Compariſon* more fully.



CONSENT OF VISIBLES and Audibles.

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Both of them ſpread themſelves in Round and fill a whole Flore or Orbe, unto certain Limits: And are carried a great way, And do languish and leſſen by degrees, according to the Diſtance of the Objects from the Senſories.

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Both of them have the whole *Species* in every ſmall portion of the *Air* or *Medium*, ſo as the *Species* do paſs through ſmall *Cranies*, without Confuſion: As we ſee ordinarily in *Levels*, as to the *Eyes*; and in *Cranies*, or *Chinks*, as to the *Sound*.

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Both of them are of a ſudden and eaſie Generation and Delation; and like- wiſe periſh ſwiftly, and ſuddenly; as if you remove the *Light*; Or touch the *Bodies* that give the *Sound*.

Both

Both of them do receive and and carry exquisite and accurate Differences; As of Colours, Figures, Motions, Distances, in Visibles; and of Articulate Voices, Tones, Songs, and Quaverings, in Audibles. 258

Both of them, in their Vertue and Working, do not appear to emit any Corporall Substance into their Mediums, or the Orbe of their Vertues; Neither again to rise or stir any evident locall Motion in their Mediums, as they pass; But only to carry certain Spirituall Species. The perfect knowledge of the Cause whereof, being hitherto scarcely attained, we shall search and handle in due place 259

Both of them seem not to generate or produce any other Effect in Nature, but such as appertaineth to their proper Objects and senses, and are otherwise Barren. 260

But Both of them in their own proper action, do work three manifest Effects. The First, in that the stronger pieces drowneth the Lesser; as the Light of the Sun, the light of a Gloworm; the Report of an Ordnance, the Voice; The Second, in that an Object of surcharge or excess destroyeth the sense; as the Light of the sun the Eye, a violent Sound (near the Ear) the Hearing: The Third, in that both of them will be reverberated; As in Mirrors; And in Echo's. 261

Neither of them doth destroy or hinder the Species of the other, although they encounter in the same Medium; as Light or Colour hinder not Sound; Nor e contra. 262

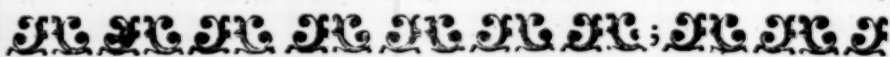
Both of them affect the Sense in Living Creatures, and yield Objects of Pleasure and Dislike: Yet nevertheless, the Objects of them do also (if it be well observed) affect and work upon dead Things; Namely such, as have some Conformity with the Organs of the two Senses; as Visibles work upon a Looking-glasse, which is like the pupill of the Eye; and Audibles upon the places of Echo, which resemble, in some sort, the Caverne and structure of the Ear. 263

Both of them do diversly work as they have their Medium diversly disposed. So a Trembling Medium (as sioak) maketh the Object seem to tremble; and a Rising or falling Medium (as Winds) maketh the Sounds to rise or fall. 264

To Both, the Medium, which is the most Propitious and Conducibile, is Air; For Glas or Water, &c. are not comparable. 265

In Both of them, were the Object is Fine and Accurate, it conduceth much to have the Sense intentive, and Erect; Inso much as you contract your Eye, when you would see sharply; and erect your Ear, when you would hear attentively; which in Beasts that have Eares moveable, is most manifest. 266

The Beames of Light, when they are multiplied, and conglomerate, generate Heat; which is a different Action, from the Action of Sight: And the Multiplication and Conglomeration of Sounds, doth generate an extreme Rarefaction of the Air; which is an Action materiante, differing from the Action of Sound. If it be true (which is anciently reported) that Birds, with great shouts, have fallen down. 267



DISSENT OF VISIBLES and Audibles.

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THe Species of *Visibles* seem to be *Emissions* of *Beames* from the *Object* seen ; almost like *Odours*, save that they are more incorporeall ; But the Species of *Audibles* seem to participate more with *Locall Motion* like *Percussions* or *Impressions* made upon the *Air*. So that whereas all *Bodies* do seem to work in two manner ; Either by the *Communication* of their *Natures* ; or by the *Impressions* and *Signatures* of their *Motions* ; The *Diffusion* of Species *Visible* seemeth to participate more of the former *Operation* and the Species *Audible* of the latter.

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The Species of *Audibles* seem to be carried more manifestly thorow the *Air*, than the Species of *Visibles* : For I conceive, that a contrary strong wind will not much hinder the sight of *Visibles*, as it will do the Hearing of *Sounds*.

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There is one *Difference*, above all others, between *Visibles* and *Audibles* that is the most remarkable ; as that whereupon many smaller *Differences* do depend : Namely, that *Visibles*, (except *Lights*) are carried in *Right Lines*, and *Audibles* in *Arcuate Lines*. Hence it cometh to passe, that *Visibles* do not intermingle and confound one another, as hath been said before ; but *Sounds* do. Hence it cometh that the solidity of *Bodies* doth not much hinder the sight so that the *Bodies* be clear, and the *Pores* in a right *Line*, as in *Glass*, *Chrystal*, *Diamonds*, *Water*, &c. but a *Thin Scarf* or *Handkerchief*, though they be *Bodies* nothing so solid, hinder the sight : whereas (contrariwise) these *Porous Bodies* do not much hinder the Hearing, but solid *Bodies* do almost stop it, or at least attenuate it. Hence also it cometh, that to the *Reflexion* of *Visibles*, small *Glasses* suffice, but to the *Reverberation* of *Audibles*, are required greater spaces, as hath likewise been said before.

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Visibles are seen further off, than *Sounds* are heard ; Allowing nevertheless the *Rate* of their *Eigneß* : For otherwise a great *Sound* will be heard further off, than a small *Body* seen.

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Visibles require (generally) some *Distance* between the *Object*, and the *Eie* to be better seen ; whereas in *Audibles*, the nearer the *Approach* of the *Sound* is to the sense the better, But in this there may be a double *Errour*. The one because to *Seeing* there is required *Light* ; And any thing that toucheth the *Pupill* of the *Eie* (all over,) excludeth the *Light*. For I have heard of a *Person* very credible, (who himselfe was cured of a *Cataract* in one of his *Eies*,) that while the silver needle did work upon the sight of his *Eie*, to remove the filme of the *Cataract*, he never saw any thing more clear or perfect, than that white *Needle* : Which (no doubt) was, because the *Needle* was lesser than the *Pupill* of the *Eie*, and so took not the *Light* from it. the other *Errour* may be, for that the *Object* of *Sight* doth strike upon the *pupill* of the *Eie*, directly without any interception ; whereas the *Cave* of the *Ear* doth hold off the *Sound* a little from the *Organ* : And so nevertheless there is some *Distance* required in both.

Visibles are swifter carried to the sense, than *Audibles* : As appeareth in *Thunder*

Thunder and Lightning; Flame and Report of a Peece; Motion of the Air in hewing of Wood. All which have been set down heretofore, but are proper for this Title.

I conceive also, that the *Species* of *Audibles*, do hang longer in the Air than those of *Visibles*: For although even those of *Visibles*, do hang some time, as we see in *Rings turned*, that shew like Spheres; In *Lute-strings* fillopped; a *Fire-brand* carried a long, which leaveth a Train of Light behind it, and in the *Twilight*; and the like: Yet I conceive that *Sounds*, stay longer because they are carried up and down with the Wind: And because of the Distance of the Time, in *Ordnance discharged* and heard twenty miles off.

In *Visibles*, there are not found Objects so odious and ingrate to the Sense, as in *Audibles*. For foul *Sights* do rather displease, in that they excite the Memory of foul Things; than in the immediate Objects. And therefore in *Pictures*, those foul *Sights* do not much offend; But in *Audibles*, the Grating of a Saw when it is sharpened doth offend so much as it setteth the Teeth on Edge; And any of the *harsh discords* in *Musick*, the Ear doth straitwaies refuse.

In *Visibles*, after great Light, if you come suddenly into the *Dark*; Or contrariwise out of the *Dark* into a *Claring Light*. The Eye is dazled for a time, and the *sight* confused; but whether any such effect be after great *Sounds*, or after a deeper silence may be better enquired. It is an Old Tradition, that those that dwell neer the *Cataracts* of *Nilus*, are stricken deaf: But we find no such effect in *Cannoniers*, nor *Millers*, nor those that dwell upon *Bridges*.

It seemeth that the *Impression* of *Colour* is so weak, as it worketh not, but by a Cone of direct *Beames*, or *Right Lines*; whereof the Basis is in the Object and the *Verticall* point in the Eye; So as there is a *Corradiation* and *Conjunction* of *Beames*; and those *Beames* so sent forth, yet are not of any force to beget the like borrowed or second *Beames*, except it be by *Reflexion*, whereof we speak not. For the *Beames* passe and give little Tincture to that Air which is adjacent; which if they did we should see *Colours* out of a *Right line*. But as this in *Colours*, so otherwise it is in the *Body of Light*. For when there is a skreen between the *Candle* and the Eye, yet the *Light* passeth to the paper whereon one writeth; so that the *Light* is seen where the *Body of the Flame* is not seen; and where any *Colour* (if it were placed where the *Body of the Flame* is) would not be seen. I judge that *Sound* is of this latter Nature: For when two are placed on both sides of a Wall, and the voice is heard, I judge it is not only the *Originall Sound*, which passeth in an *Arched Line*; But the *Sound*, which passeth above the Wall in a *Right Line*, begetteth the like the Motion round about it, as the first did, though more weak.

ALL *Concords* and *Discords* of *Musick*, (no doubt) *Sympathies* and *Antipathies* of *Sounds*, and so (likewise) in that *Musick*, which we call *Broken Musick*, or *Consort Musick*; some *Consorts* of *Instruments*, are sweeter than others; (a Thing not sufficiently yet observed:) As the *Irish Harp*, and *Base Violl* agree well: The *Recorder* and *stringed Musick* agree well: *Organs* and the *Voice* agree well, &c. But the *Virginalls* and the *Lute*; Or the *Welch-Harp*, and *Irish-Harp*; Or the *Voice* and *Pipes* alone, agree not so well; but for the *Melioration* of *Musick* there is yet much left (in this Point of *Exquisite Consorts*) to try and enquire.

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Experiments
in Consort
touching the
Sympathy, or
Antipathy, of
Sounds, one
with another.

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279 There is a Common Observation, that if a *Lute* or *Vial*, be laid upon the Back with a small straw upon one side of the *strings*; and another *Lute* or *Vial* be laid by it; And in the other *Lute* or *Viall* the *Unison* to that *string* be stricken, it will make the *string* move; Which will appear both to the *Eie*, and by the *straws* falling off. The like will be if the *Diapason* or *Eight* to that *string* be stricken, either in the same *Lute* or *Viall*, or in others lying by; But in none of these there is any report of *Sound*, that can be discerned but onely Motion.

280 It was devised, that a *Viall* should have a Lay of Wire-Strings below, as close to the Belly as a *Lute*; and then the *strings* of Guts mounted upon a Bridge as in ordinary *Vials*; To the end that by this meanes, the upper *strings* stricken, should make the lower resound by *Sympathy*, and so make the *Musick* the better; which if it be to purpose, than *Sympathy* worketh as well by report of *Sound*, as by *Motion*. But this device I conceive to be of no use because, the upper *strings*, which are stopped in great variety, cannot maintain a *Diapason* or *Unison*, with the Lower which are never stopped. But if it should be of use at all; it must be in *Instruments* which have no stops; as *Virginals* and *Harps*; wherein trial may be made of two Rows of strings distant the one from the other.

281 The Experiment of *Sympathy* may be transferred (perhaps) from *Instruments* of *strings* to other *Instruments* of *Sound*. As to try if there were in one steeple two *Bells* of *Unison*, whether the striking of the one would move the other, more than if it were another Accord: And so in *Pipes*, if they be of equall Bore, and *Sound*,) whether a little straw or Feather would move in the one Pipe, when the other is blown at an *Unison*.

282 It seemeth both in *Ear* and *Eie*, the *Instrument* of *Sense* hath a *Sympathy* or similitude with that which giveth the *Reflexion*; (As hath been touched before) For as the *sight* of the *Eie* is like a Chrystiall, or Glass, or Water. So is the *Ear* a sinuous Cave with a hard Bone, to stop and reverberate the *Sound*: Which is like to the Places that report *Eccho's*.

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Experiments
in Confort
touching the
Hndring, or
Helping of the
Hearing.

When a Man Tawneeth he cannot bear so well. The Cause is for that the *Membrane* of the *Ear* is extended; And so rather casteth off the *Sound*, than draweth it to.

284 We Hear better when we hold our *Breath*, than contrary; In somuch as in all Listening to attain a *Sound* a far off, Men hold their *Breath*: The Cause is, for that in all *Expiration*, the Motion is outwards; and therefore rather driveth away the voice than draweth it: And Besides we see that in all *Labour* to do things with any strength, we hold the *Breath*: And listening after any *Sound*, that is heard with difficulty is a kind of *Labour*.

285 Let it be tried, for the *Help* of the *Hearing*, (and I conceive it likely to succeed) to make an *Instrument* like a *Tunnell*; the narrow Part whereof may be of the Bignesse of the hole of the *Ear*; and the Broader End much larger; like a *Bell* at the skirts; and the length halfe a foot or more. And let the narrow End of it be set close to the *Ear*. And marke whether any *Sound* abroad in the open Air, will not be heard distinctly, from further distance, than without that *Instrument*; being (as it were) an *Ear-spell* acle. And I have heard there is in *Spain*, an *Instrument* in use to be set to the *Ear*, that helpeth somewhat those that are Thick of Hearing.

286 If the *Mouth* be shut Close, nevertheless there is yielded by the Roof of the mouth, a Murmur: such as is used by dumb Men: But if the *Nostrills* be likewise stoped no such Murmur can be made; Except it be in the Bot-

come of the *Pallate* towards the throat. Whereby it appeareth manifestly, that a *Sound* in the *Mouth*, except such as *forefaid*, if the *Mouth* be stop-
ped passeth from the *Pallate* through the *Nostrils*.

THe *Repercussion* of *Sounds*, (which we call *Eccho*) is a great Argument of the *Spiritual Essence* of *Sounds*. For if it were *Corporeall*, the *Repercussing* should be created in the same manner, and by like *Instruments*, with the *Originall Sound* : But we see what a number of *Exquisite Instruments* must concur in speaking of *Words*, whereof there is no such matter in the *Returning* of them ; But onely a plain stop, and *Repercussion*.

The *Exquisite Differences* of *Articulate Sounds*, carried along in the *Air* shew that they cannot be *Signatures* or *Impressions* in the *Air*, as hath been well refuted by the *Ancients*. For it is true, that *Seals* make excellent *Impressions* : And so it may be thought of *Sounds* in their first Generation : But then the *Delation* and *Continuance* of them without any new Sealing shew apparently they cannot be *Impressions*.

All *Sounds* are suddenly made, and do suddenly perish ; But neither that nor the *Exquisite Differences* of them, is matter of so great Admiration : For the *Quaverings*, and *Warblings* of *Lutes*, and *Pipes* are as swift ; And the *Tongue* (which is no very fine Instrument) doth in speech, make no fewer *Motions*, than there be letters in all the *Words*, which are uttered. But that *sounds* should not onely be so speedily generated, but carried so farre every way, in such a momentany time, deserveth more admiration. As for Example ; If a man stand in the middle of a *Field*, and speak aloud, he shall be heard a *Furlong* in round ; and that shall be in *Articulate Sounds* ; and those shall be Entire in every little *Portion* of the *Air* ; and this shall be done in the space of lesse than a minute.

The *sudden Generation* and *Perishing* of *Sounds*, must be one of these two *Wayes*. Either that the *Air* suffereth some force by *Sound*, and then restor-
eth it selfe ; as *Water* doth ; Which being divided, maketh many *Circles*, till it restore it selfe to the natural Consistence : Or otherwise, that the *Air* doth willingly imbibe the *Sound* as gratefull, but cannot maintain it ; for that the *Air* hath (as it should seeme) a secret and hidden Appetite of Receiving the *Sound* at the first ; But then other *Gross* and more *Materiate Qualities* of the *Air* straight wayes suffocate it ; like unto *Flame* which is generated with *Alacrity*, but straight quenched by the *Enmity* of the *Air* or other *Ambient Bodies*,

There be these *Differences* (in generall) by which *Sounds* are divided ; 1. *Musicall*, *Immusicall* ; 2. *Treble*, *Base* ; 3. *Flat*, *Sharp* ; 4. *Soft*, *Loud*, 5. *Exteriour*, *Interiour* ; 6. *Clean*, *Harsh*, or *Purling* ; 7. *Articulate*, *Inarticulate*.

We have laboured (as may appear) in this *Inquisition* of *Sounds* dilligently : Both because *Sound* is one of the most *Hidden Portions* of *Nature*, (as we said in the beginning) And because it is a *Vertue* which may be called *Incorporeall*, and *Immateriate* where-
of there be in *Nature* but few. Besides, we were willing, (now in these our first *Centuries*,) to make a *Patterne* or *President* of an

Experiments
in Confort
touching the
Spiritual and
Fine Nature of
Sounds.

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Exact Inquisition ; And we shall do the like hereafter in some other Subjects which require it. For we desire that Men should learn and perceive how severe a Thing the true *Inquisition* of Nature is; And should accustom themselves, by the light of Particulars, to enlarge their Mindes, to the Amplitude of the World; and not reduce the World to the narrowness of their Mindes.

Experiment
Solitary,
touching the
Orient Colours
in Dissolution of
Metals.

291

Metalls give *Orient* and *Fine Colours* in *Dissolution*; As *Gold* giveth an excellent *Yellow*; *Quick silver* an excellent *Green*; *Tinne* giveth an excellent *Azure* : Likewise in their *Putrefactions*, or *Rusts*; As *Vermilion*, *Verdegrease*, *Bise*, *Cirrus*, &c. And likewise in their *Vitrification*. The Cause is, for that by their strength of Body, they are able to indure the Fire, or strong Waters, and to be put into an Equall Posture; and again to retain Part of their principall Spirit; Which two things, (Equall posture, and Quick Spirits) are required chiefly, to make Colours lightsome.

Experiment
Solitary touch-
ing Prolon-
gation of Life.

292

IT conduceth unto *Long Life*, and to the more Placide Motion of the Spirits, which thereby do lesse prey and consume the Juyce of the Body; Either that *Mens Actions* be free and *Voluntary*; that nothing be done *invitâ Minerva*, but *secundum genium* : Or on the other side, that the *Actions* of Men be full of *Regulation*, and *Commands* within themselves : For then the Victory and performing of the Command, giveth a good disposition to the Spirits; Especially if there be a proceeding from Degree to Degree; For then the Sense of Victory is the greater. An example of the former of these, is in a Countrey life : And of the latter, in *Monks* and *Philosophers*, and such as do continually enjoinne themselves.

Experiment
Solitary, touch-
ing Appetite
of Union in
Bodies.

293

IT is certain, that in all Bodies, there is an *Appetite* of *Union*, and *Evitation* of *Solution* of *Continuity* : And of this *Appetite* there be many *Degrees*; But the most *Remarkeable* and fit to be distinguished are three. The first in *Liquors*; The second in *Hard Bodies*; And the third in *Bodies* *Cleaving* or *Tenacious*. In *Liquors* this *Appetite* is weak. We see in *Liquors*, the *Thredding* of them in *Stillicides*, (as hath been said) The *Falling* of them in *Round Drops* (which is the form of *Union*); and the *Staying* of them for a little time, in *Bubbles* and *Froth*. In the second *Degree* or *Kind*, this *Appetite* is strong; as in *Iron*, in *Stone*, in *Wood* &c. In the third, this *Appetite* is in a *Medium* between the other two : For such *Bodies* do partly follow the *Touch* of another Body; And partly stick and continue to themselves; and therefore they roap and draw themselves in *Threds*; as we see in *Pitch*, *Glew*, *Birdlime*, &c. But note, that all *Solid Bodies* are *Cleaving*, more or lesse; and that they love better the *Touch* of somewhat that is *Tangible*, than of *Air*. For *Water* in small quantity cleaveth to any thing that is solid; and so would *Metall* too, if the weight drew it not off. And therefore *Gold Foliate*, or any *Metall Foliate*, cleaveth : But those *Bodies* which are noted to the *Clammy*, and *Cleaving*, are such, as have a more indifferent *Appetite* (at once) to follow another *Body*; and to hold to themselves. And therefore they are commonly *Bodies* ill mixed; and which take more pleasure in a *Forrain Body*, than in preserving there own *Consistence*; and which have little predominance in *Drought* or *Moisture*:

Time

Time, and Heat, are Fellows in many Effects. Heat drieth Bodies, that do easily expire; as Parchment, Leaves, Roots, Clay, &c. And, so doth Time or Age arefie; as in the same Bodies, &c. Heat dissolveth and melteth Bodies, that keep in their Spirits; as in divers *Liquefactions*; and so doth Time, in some Bodies of a softer Consistence: As is manifest in Honey, which by Age waxeth more liquid; and the like in Sugar; and so in old Oyl, which is ever more clear and more hot in Medicinable use. Heat causeth the Spirits to search some Issue out of the Body, as in the *Volatility* of Metals; and so doth Time; as in the *Rust* of Metals. But generally Heat doth that in small time, which Age doth in long.

Experiment
Solitary, touch-
ing the like
Operations of
Heat, and Time.

294

Some things, which pass the Fire are softest at first, and by Time grow Shard; as the Crumme of Bread. Some are harder when they come from the Fire, and afterwards give again, and grow soft, as the Crust of Bread, Bisket, Sweet Meats, Salt, &c. The Cause is, for that in those things which wax Hard with Time, the Work of the Fire is a kind of *Melting*: And in those that wax soft with Time, (contrariwise,) the work of the Fire is a kind of *Baking*; and whatsoever the Fire baketh, Time doth in some degree dissolve.

Experiment
Solitary, touch-
ing the dis-
solving Operati-
on of Time,
and Fire.

295

Motions pass from one Man to another, not so much by Exciting Imagination, as by Invitation; Especially if there be an Aptness or Inclination before. Therefore *Gaping*, or *Yawning*, and *Stretching* do pass from Man to Man; For that that causeth *Gaping* or *Stretching* is, when the Spirits are a little Heavy, by any Vapour, or the like. For then they strive (as it were,) to wring out, and expell that which loadeth them. So Men drowzy, and desirous to sleep; Or before the fit of an Ague; do use to Yawn and Stretch, and do likewise yield a Voice or Sound, which is an *Interjection* of *Expulsion*: So that if another be apt and prepared to do the like, he followeth by the sight of another. So the *Laughing* of another maketh to *Laugh*.

Experiment
Solitary, touch-
ing Motions
by Imitation.

296

There be some known Diseases that are *Infectious*; and others that are not. Those that are *Infectious*, are; First, such as are chiefly in the Spirits, and not so much in the *Humours*; and therefore pass easily from Body to Body: Such are *Pestilences* *Lippitudes*, and such like. Secondly, such as Taint the *Breath*; Which we see passeth manifestly from Man to Man; and not invisible, as the *Affects* of the *Spirits* do: Such are *Consumptions* of the *Lungs*, &c. Thirdly, such as come forth to the *Skin*; and therefore taint the *Air*, or the *Body Adjacent*; Especially if they consist in an *Unctuous* substance, not apt to dissipate; such are *Scabs*, and *Leprosie*. Fourthly, such as are meerly in the *Humours*, and not in the *Spirits*, *Breath*, or *Exhalations*: And therefore they never infect, but by *Touch* only; and such a *Touch* also, as cometh within the *Epidermis*; as the venome of the *French Pox*; and the *Biting* of a *Mad Dog*.

Experiment
Solitary, touch-
ing Infecti-
ous Diseases.

297

Most Powders grow more Close and Coherent by Mixture of Water than by Mixture of Oyl, though Oyl be the thicker Body; as Meal, &c. The Reason is the Congruity of Bodies; which if it be more, maketh a Perfecter Imbibition, and Incorporation; Which in most Powders is more between Them and Water, than between Them and Oyl: But Painters Colours ground, and Ashes, do better incorporate with Oyl.

Experiment
Solitary, touch-
ing the In-
corporation of
Powders, and
Liquors.

298

Experiments
Solitary touch-
ing Exercise
of the Body.

299

Much Motion and Exercise is good for some Bodies; and Sitting, and less Motion for others. If the Body be Hot, and Void of Superfluous Moistures, too much Motion hurteth: And it is an Errour in Physicians, to call too much upon Exercise. Likewise men ought to beware, that they use not Exercise and a Spare Diet both: but if much Exercise, then a Plentiful Diet; and if Sparing Diet, then little Exercise. The Benefits that come of Exercise are. First, that it sendeth Nourishment into the Parts more forcibly. Secondly, that it helpeth to Excerne by Sweat, and so maketh the Parts assimilate the more perfectly. Thirdly, that it maketh the Substance of the Body more Solid and Compact; and so less apt to be Consumed and Depressed by the Spirits. The Evils that come of Exercise, are: First, that it maketh the Spirits more Hot and Predatory. Secondly, that it doth absorb likewise, and attenuate too much the Moisture of the Body. Thirdly, that it maketh too great Concussion, (especially if it be violent,) of the inward Parts; which delight more in Rest. But generally Exercise, if it be much, is no Friend to Prolongation of Life; Which is one Cause, why Women live longer then Men, because they stirre less.

Experiments
Solitary, touch-
ing Meats
that induce
Satiety.

300

Some Food we may use long, and much, without Glutting; As bread, Flesh that is not Fat, or Rank, &c. Some other, (though pleasant) Glutteth sooner; As sweet Meats, Fat Meats, &c. The Cause is, for that Appetite consisteth in the Emptiness of the Mouth of the Stomach; Or possessing it with somewhat that is Astringent; and therefore Cold and Dry. But things that are Sweet and Fat, are more Filling: And do swim and hang more about the Mouth of the Stomach; and go not down so speedily: And again turn sooner to Choler, which is hot, and ever abateth the Appetite. We see also, that another Cause of Satiety, is an Over-Custom; and of Appetite is Novelty: And therefore Meats, if the same be continually taken, induce Lethargy. To give the reason of the Distaste of Satiety, and of the Pleasure in Novelty; and to distinguish not only in Meats and Drinks, but also in Motions, Loves, Company, Delight, Studies, what they be that Custom maketh more gratefull; and what more tedious, were a large Field. But for Meats the Cause is Attraction, which is quicker, and more excited towards that which is new, than towards that whereof there remaineth a Relish by former use. And (generally) it is a Rule, that whatsoever is somewhat Ingrate at first, is made Gratefull by Custom, But whatsoever is too Pleasing at first, groweth quickly to Satiety.

NATURAL



NATURAL HISTORY.

IV. Century.



ACCELERATION of *Time*, in *Works* of *Nature*, may well be esteemed *inter Magnalia Naturæ*. And even in *Divine Miracles Accelerating* of the *Time*, is next to the *Creating* of the *Matter*. We will now therefore proceed to the Enquiry of it: And for *Acceleration* of *Germination*,

Experiments
in Confort
touching the
Clarification of
Liquors, and
the Accelerating
thereof.

we will referre it over unto the place, where we shall handle the Subject of *Plants*, generally; And will now begin with other *Accelerations*.

Liquors are (many of them,) at the first, thick and troubled; As *Must*, *Wort*, *Juyce* of *Fruits*, or *Herbs* expressed, &c. And by *Time*, they settle, and Clarifie. But to make them clear, before the *Time*, is a great work; For it is a Spur to *Nature*, and putteth her out of her pace: And besides, it is of good use, for making *Drinks*, and *Sauces*, *Potable*, and *Serviceable*, speedily; But to know the *Meanes* of *Accelerating Clarification*, we must first know the *Causes* of *Clarification*. The first *Cause* is, by the *Separation* of the *Grosser Parts* of the *Liquor*, from the *Finer*. The second, by the *Equall Distribution* of the *Spirits* of the *Liquor*, with the *Tangible Parts*: For that ever representeth *Bodies* clear and untroubled. The third, by the *Refining* the *Spirit* it self, which thereby giveth to the *Liquor* more *Splendour*, and more *Lustre*.

301

First, for *Separation*: It is wrought by *Weight*; as in the ordinary *Residence* or *settlement* of *Liquors*: By *Heat*: By *Motion*: By *Precipitation*, or *Sublimation*; (That is, a *Calling* of the severall *Parts*, either up, or down, which is a kind of *Attraction*;) By *Adhesion*; as when a *Body* more *Viscous* is mingled and agitated with the *Liquor*; which *Viscous Body* (afterwards severed) draweth with it the *grosser Parts* of the *Liquor*: And lastly by *Percolation* or *Passage*.

302

Secondly,

303 Secondly, for the *Even Distribution* of the *Spirits*; It is wrought by *Gentle Heat*; and by *Agitation of Motion*; (For of *Time* we speak not, because it is that, we would anticipate and represent:) And it is wrought also, By *Mixture* of some other *Body*, which hath a *vertue* to open the *Liquor*, and to make the *Spirits* the better pass thorow.

304 Thirdly, for the *Refining* of the *Spirit*, it is wrought likewise by *Heat*, By *Motion*, and by *Mixture* of some *Body* which hath *Vertue* to attenuate. So therefore (having shewed the *Causes*;) for the *Accelerating* of *Clarification*, in generall, and the *Enducing* of it; take these *Instances*, and *Trialls*.

305 It is in common Practice, to draw *Wine*, or *Beer*, from the *Lees*, (which we call *Racking*;) whereby it will *Clarifie* much the sooner: For the *Lees*, though they keep the *Drink* in Heart, and make it lasting; yet withall they cast up some *Spissitude*: And this *Instance* is to be referred to *Separation*.

306 On the other side, it were good to try, what, the Adding to the *Liquor*, more *Lees* than his own will work; For though the *Lees* do make the *Liquor* turbide, yet they refine the *Spirits*. Take therefore a Vessell of *New Beer*; and take another Vessell of *New Beer*, and Rack the one Vessel from the *Lees*, and poure the *Lees* of the racked Vessel into the unracked Vessel, and see the effect: This *Instance* is referred to the *Refining* of the *Spirits*.

307 Take *New Beer*, and put in some Quantity of *Stale Beer* into it, and see whether it will not *Accelerate* the *Clarification*, by opening the *Body* of the *Beer*, and Cutting the *Grosser Parts*, whereby they may fall down into *Lees*. And this *Instance* again is referred to *Separation*.

308 The longer *Molt*, or *Herbs*, or the like, are Infused in *Liquor*, the more thick and troubled the *Liquor* is; But the longer they be decocted in the *Liquor*; the clearer it is. The reason is plain, because in *Infusion*, the longer it is, the greater is the Part of the *Gross Body*, that goeth into the *Liquor*: But in *Decoction*, though more goeth forth, yet it either purgeth at the Top, or setteth at the Bottome. And therefore the most Exact way to *Clarifie* is; First to *Infuse*, and then to take off the *Liquor*, and *Decoct* it; as they do in *Beer*, which hath *Molt* first infused in the *Liquor*, and is afterwards boyled with the *Hop*. This also is referred to *Separation*.

309 Take *Hot Embers*, and put them about a Bottle filled with *New Beer*, almost to the very Neck: Let the Bottle be well stopped, lest it flie out: And continue it, renewing the *Embers* every day, by the space of ten days, and then compare it with another Bottle of the same *Beer* set by. Take also *Lime* both *Quenched*, and *Unquenched*, and set the Bottles in them, *ut supra*. This *Instance* is referred, both to the *Even Distribution*, and also to the *Refining* of the *Spirits* by *Heat*.

310 Take *Bottles*, and *Swing* them; Or *Carry* them in a *Wheel-Barrow*, upon *Rough Ground*; twice in a day: But then you may not fill the *Bottles* full, but leave some *Air*; For if the *Liquor* come close to the *Stopple*, it cannot play, nor flower: And when you have shaken them well, either way, pour the *Drink* in another *Bottle*, Stopped close, after the usuall manner; For if it stay with much *Air* in it, the *Drink* will pall; Neither will it settle so perfectly in all the Parts. Let it stand some 24 hours: Then take it, and put it again into a *Bottle* with *Air*; *ut supra*. And thence into a *Bottle* Stopped, *ut supra*: And so repeat the same *Operation* for seven dayes. Note that in the *Emptying* of one *Bottle* into another, you must do it swiftly, lest the *Drink* pall. It were good also, to try it in a *Bottle* with a little *Air* below the Neck, without *Emptying*. This *Instance* is referred to the *Even Distribution* and *Refining* of the *Spirits* by *Motion*.

As for *Percolation*, inward, and outward, (which belongeth to *Seperation*,) Triall would be made of *Clarifying* by *Adhesion*, with *Milke* put into *New Beer* and stirred with it: For it may be, that the *Grosser Part* of the *Beer* will cleave to the *Milke*: The Doubt is whether the *Milke* will sever well again; which is soon tried. And it is usuall in *clarifying Ippocrasse* to put in *Milke*; which after severeth and carrieth with it the *Grosser Parts* of the *Ippocrasse*; as hath been said else where. Also for the better *Clarification* by *Percolation*; when they tun *New Beer*, they use to let it passe through a *Strainer*; And it is like the finer the *Strainer* is, the clearer it will be.

The *Accelerating* of *Maturation* we will now enquire of. And of *Maturation* it selfe. It is of three *Natures*. The *Maturation* of *Fruits*: The *Maturation* of *Drinks*: And the *Maturation* of *Impostumes* and *Ulcers*. This last we referre to another place, where we shall handle *Experiments Medicinall*. There be also other *Maturations*, as of *Metals*, &c. Whereof we will speak as occasion serveth. But we will begin with that of *Drinks*, because it hath such affinity with the *Clarification* of *Liquors*.

Experiments in Confort touching *Maturation*, and the *Accelerating* thereof. And first touching the *Maturation* and *Quickning* of *Drinks*. And next touching the *Maturation* of *Fruits*.

For the *Maturation* of *Drinks*; it is wrought by the *Congregation* of the *Spirits* together, whereby they digest more perfectly the *Grosser Parts*; and it is effected partly, by the same meanes, that *Clarification* is, (whereof we spake before; But then note, that an extreme *Clarification* doth spread the *Spirits* so smooth as they become Dull, and the *Drink* dead, which ought to have a little *Flouring*. And therefore all your clear *Amber Drink* is flat.

We see the degrees of *Maturation* of *Drinks*; In *Must*, In *Wine*, as it is drunk and in *Vinegar*. Whereof *Must* hath not the *Spirits* well congregated; *Wine* hath them well united, so as they make the parts somewhat more Oily. *Vinegar* hath them congregated but more Jeune, and in smaller quantity; The greatest and finest *Spirit* and *Part* being exhaled. For we see *Vinegar* is made by setting the Vessell of *Wine* against the hot Sunne. And therefore *Vinegar* will not burn; for that much of the finer *Part* is exhaled.

The *Refreshing* and *Quickning* of *Drink* Palled, or Dead, is by *Enforcing* the *Motion* of the *Spirit*: So we see that *Open Weather* relaxeth the *Spirit*, and maketh it more lively in *Motion*. We see also *Bottelling* of *Beer*, or *Ale*, while it is new and full of *Spirit*, (so that it spirteth when the *Stopples* is taken forth) maketh the *Drink* more quick and windy. A *Pan* of *Coales* in the *Cellar* doth likewise good, and maketh the *Drink* work again. *New Drink* put to *Drink* that is Dead, provoketh it to work again: Nay, which is more, (as some affirme) A *Brewing* of *New Beer*, set by *Old Beer*, maketh it work again: It were good also to *Enforce* the *Spirits* by some *Mixtures*, that may excite and quicken them; as by the putting into the *Bottles*, *Nitre Chalke*, *Lime*, &c. We see *Cream* is *Matured*, and made to rife more speedily, by Putting in *Cold Water*; which, as it seemeth, getteth down the *Whey*.

It is tried, that the *Burying* of *Bottles* of *Drink* well stopped, either in dry *Earth* a good depth; or in the *Bottom* of a *Well* within *Water*; and best of all the *Hanging* of them in a deep *Well* somewhat above the *Water*, for some fortnights space, is an excellent *Meanes* of making *Drink* fresh, and quick

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quick : For the *Cold* doth not cause any exhaling of the *Spirits* at all; as *Heat* doth, though it rarifieth the rest that remain : But *Cold* maketh the *Spirits* vigorous and irritateth them, whereby they incorporate the Parts of the *Liquor* perfectly.

316 As for the *Maturation* of *Fruits*; It is wrought by the calling forth of the *Spirits* of the *Body* outward, and so spreading them more smoothly : and likewise by *Digesting*, in some degree, the *Grosser* parts ; and this is effected by *Heat*; *Motion*; *Attraction*; and by a *Rudiment* of *Puresfaction* : For the *Inception* of *Putrefaction* hath in it a *Maturation*.

317 There were taken *Apples*, and Laid in *Straw*; In *Hay*, In *Flower*, In *Chalk*, In *Lime*; Covered over with *Onions*; covered over with *Crabs*; Closed up in *Wax*, shut in a *Box* &c. There was also an *Apple* hanged up in *Smoak* Of all which the *Experiment* sorted in this Manner:

318 After a months space, the *Apple*, Enclosed in *Wax*, was as *Green* and *Fresh* as at the first putting in, and the *Kernels* continued *White*. The *Cause* is, for that all *Exclusion* of *Open Air*, (which is ever *Predatory*) maintaineth the *Body* in his first *Freshness* and *Moisture* : But the *Inconvenience* is that it tasteth a little of the *Wax*: Which, I suppose, in a *Fomegrate*, or some such thick coated *Fruit*, it would not do.

319 The *Apple* hanged in the *smoak* turned like an old mellow *Apple* *Wrinkled*, *Dry*, *Soft*, *Sweet*, *Yellow* within. The *Cause* is, for that such a degree of *Heat*, which doth neither melt nor scorch (for we see that in a greater *Heat*; a *Roast Apple* softneth and melteth, and *Pigs feet* made of *Quarters* of *Wardens*; scorch and have a *Skin* of *Cole*) doth mellow, and not adure: The *smoak* also maketh the *Apple* (as it were) sprinkled with *Spot*, which helpeth to *Mature*. We see that in *Drying* of *Pears*, and *Prunes*, in the *Oven*, and removing of them often as they begin to sweat, there is alike *Operation*; But that is with a far more intense degree of *Heat*.

320 The *Apples*, covered in the *Lime* and *Ashes*, were well *Matured*, as appeared both in their *Yellowness* and *Sweetness*. The *Cause* is, for that that *Degree* of *Heat*, which is in *Lime* and *Ashes*, (being a smothering *Heat*) is of all the rest most *Proper*; for it doth neither *Liquefie* nor *Archie*; and that is true *Maturation*. Note that the *Taste* of those *Apples* was good, and therefore it is the *Experiment* fittest for *Use*.

321 The *Apples*, covered with *Crabs* and *Onions*, were likewise well *Matured*. The *Cause* is not any *Heat*; But for that the *Crabs* and the *Onions* draw forth the *Spirits* of the *Apple*, and spread them equally thorowout the *Body*; which taketh away *Hardness*. So we see one *Apple* ripeneth against another. And therefore in making of *Cider*, they turn the *Apples* first upon a heap. So one *Cluster* of *Grapes*, that toucheth another whilest it groweth, ripeneth faster; *Botrus contra Botrum citius maturescit*.

322 The *Apples*, in *Hay* and the *Straw*, ripened apparently, though not so much as the *Other*; But the *Apple*, in the *Straw* more. The *Cause* is, for that the *Hay* and *Straw* have a very low degree of *Heat*, but yet close and smothering and which dryeth not.

323 The *Apple* in the close *Box*, was ripened also : The *Cause* is for that all *Air*, kept close, hath a degree of *Warmth*: As we see in *Wool*, *Fur*, *Plush*, &c.

Note that all these were compared with another *Apple*, of the same kind, that lay of it selfe: And in *Comparison* of that, were more sweet, and more *Yellow*, and so appeared to be more *Ripe*.

324 Take an *Apple*, or *Pear*, or other like *Fruit*, and Rowle it upon a *Table* hard : We see in common *Experience*, that the *Rowling* doth soften and sweeten

sweeten the *Fruit* presently; Which is nothing but the *smooth Distribution* of the *Spirits* into the *Parts*: For the *Unequall Distribution* of the *Spirits* maketh the *Harrishnesse*: But this *Hard Rowling* is between *Concoction*, and a *simple Maturation*; Therefore if you should *Rowle* them but gently, perhaps twice a day; and continue it some seven dayes, it is like they would *Mature* more finely, and like unto the *Naturall Maturation*.

Take an *Apple*; and cut out a piece of the *Top*, and Cover it, to see whether that *Solution of Continuity* will not hasten a *Maturation*: We see that where a *Waspe*, or a *Fly*, or a *Worm* hath bitten, in a *Grape* or any *Fruit*, it will sweeten hastily.

Take an *Apple*, &c. and prick it with a *Pin* full of *Holes*, not deep, and smear it a little with *Sack*, or *Cinnamon Water*, or *Spirit of Wine*, every day, for ten dayes, to see if the *Virtuall Heat* of the *Wine*, or *Strong Waters*, will not *Mature* it.

In these *Trialls* also, as was used in the first, set another of the same *Fruits* by, to Compare them: and try them, by their *Yellownesse*, and by their *Sweetnesse*.

The *World* hath been much abused by the *Opinion* of *Making of Gold*, The *Work* it selfe I judge to be possible; But the *Meanes* (hitherto propounded) to effect it, are, in the *Practice*, full of *Errour* and *Imposture*; And in the *Theory*, full of *unfound Imaginations*. For to say, that *Nature* hath an intention to make all *Metals* *Gold*: And that, if she were delivered from *Impediments*, she would performe her owne worke: And that, if the *Crudities*, *Impurities*, and *Leprosies*, of *Metals* were cured, they would become *Gold*: And that a little *Quantity* of the *Medicine* in the *Worke* of *Projection*, will turn a *Sea* of the *Basfer Metal* into *Gold*, by *Multipling*: All these are but *dreames*: And so are many other *Grounds* of *Alchymy*. And to help the *Matter*, the *Alchymists* call in likewise many *Vanities*, out of *Astrology*: *Naturall Magick*: *Superstitious interpretations* of *Scriptures*, *Auricular Traditions*: *Feigned Testimonies* of *Ancient Authors*: and the like. It is true, on the other side they have brought to light not a few profitable *Experiments*, and thereby made the *World* some amends. But we, when we shall come to handle the *Version* and *Transmutation* of *Bodies*, And the *Experiments* concerning *Mettalls*, and *Mineralls*: will lay open the true *Wayes* and *Passages* of *Nature*, which may lead to this great effect. And we commend the *Wit* of the *Chineses*, who despaire of *Making of Gold*, but are *Mad* upon the *Making of Silver*: For Certain it is, that it is more difficult to make *Gold*, (which is the most ponderous and *Materiale* amongst *Metalls*) of other *Metalls*, lesse *Ponderous* and lesse *Materiale*, than (*vis versa*) to make *Silver* of *Lead*, or *Quick-silver*: Both which are more *Ponderous* than *Silver*: So that they need rather a further

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Experiments
Solitary touching the
Making of Gold.

ther Degree of *Fixation*, than any *Condensation*. In the mean time, by occasion of Handling the *Axiomes* touching *Maturation*, we will direct a *Trial* touching the *Maturing* of *Metals*, and thereby turning some of them into *Gold* : For we conceive indeed ; that a perfect good *Concoction*, or *Disgestion*, or *Maturation* of some *Metals* will produce *Gold*. And here we call to mind, that we knew a *Dutch man*, that had wrought himselfe into the belief of a great Person, by undertaking that he could make *Gold* : Whose discourse was, that *Gold* might be made ; But that the *Alchymists* Over fired the Work : For (he said) the Making of *Gold* did require a very temperate *Heat*, as being in *Nature* a Subterrany work, where little *Heat* cometh ; But yet more to the Making of *Gold*, than of any other *Mettall* ; And therefore, that he would do it with a great *Lamp*, that should carry a Temperate and Equall *Heat* : And that it was the work of many Months. The Devise of the *Lamp* was Folly ; But the Overfiring now used ; and the Equall *Heat* to be required ; And the making it a Work of some good Time ; are no ill Discourses.

We resort therefore to our *Axiomes* of *Maturation*, in Effect touched before. The First is, that there be used a Temperate *Heat* ; For they are ever Temperate *Heats* that *Disgests*, and *Mature* : Wherein we meane Temperate, according to the *Nature* of the *Subject* ; For that may be Temperate to *Fruits* and *Liquors*, which will not work at all upon *Metals*. The Second is, that the *Spirit* of the *Mettall* be quickned, and the *Tangible Parts* opened : For without those two Operations, the *Spirit* of the *Mettall*, wrought upon, will not be able to digest the *Parts*. The Third is, that the *Spirits* do spread themselves Even, and move not *Subsultorily*, For that will make the *Parts* close and Pliant And this requireth a *Heat* that doth not rise and fall, but continue as Equal as may be. The Fourth is, that no part of the *Spirit* be emitted but detained. For if there be *Emission* of *Spirit*, the *Body* of the *Mettall* will be Hard and Churlish. And this will be performed, partly by the Temper of the *Fire*, and partly by the closeness of the *Vessel*. The Fifth is, that there be *Choice* made of the likeliest and best prepared *Mettall*, for the *Version* : For that will facilitate the Work. The Sixth is, that you give Time enough for the Work : Not to prolong Hopes (as the *Alchymists* do ; But indeed to give *NATURE* a convenient Space to Worke in. These principles most certain, and true :

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we will now derive a direction of *Trial* out of them, which may (perhaps) by further Meditation, be improved.

Let there be a small Furnace made of a *Temperate Heat*; Let the Heat be such as may keep the Metal perpetually Moulten and no more: For that above all importeth to the Work. For the Materiall take *Silver*, which is the Metall that in Nature symbolizeth most with *Gold*; Put in also, with the *Silver* a tenth part of *Quick-silver*; and a twelfth part of *Nitre*, by weight; Both these to quicken and open the Body of the Metall: and so let the Worke be continued by the space of six Months, at the least. I wish also, that there be as sometimes an Injection of some Oiled substance; such as they use in the recovering of *Gold*, which by vexing with Separations hath been made Churlish: And this is, to lay the parts more close and smooth, which is the Main Work. For *Gold* (as we see) is the closest (and therefore the Heaviest) of Metals: And is likewise the most Flexible, and Tensible. Note that to think to make *Gold* of *Quick-silver*, because it is the heaviest, is a thing not to be hoped; For *Quick-silver* will not endure the Mannage of the Fire. Next to *Silver*, I thinke *Copper* were fittest to be the Materiall.

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Gold hath these Natures: Greatnesse of Weight; Closenesse of Parts, Fixation, Pliantnesse or Softnesse, Immunity from Rust, Colour or Tincture of Yellow. Therefore the Sure Way, (though most about) to make *Gold*, is to know the Causes of the severall Natures before rehearsed, and the Axiomes concerning the same. For if a man can make a Metall, that hath all these Properties let men dispute, whether it be *Gold* or no?

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Solitary
touching the
Nature of Gold.

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The Enducing and Accelerating of Putrefaction, is a Subject of a very Universall Enquiry For Corruption is a Reciprocall to Generation: And they two are as Natures to Termes or Boundaries; and the Guides to Life and Death, Putrefaction is the Worke of the Spirits of Bodies, which ever are unquiet to Get forth and Congregate with the Air, and to enjoy the Sunbeames. The Getting forth, or Spreading of the Spirits, (which is a Degree of Getting forth,) have five differing Operations. If the Spirits be detained within the Body, and move more violently, there followeth Colliquation; As in Metals, &c. If more Mildely, there followeth Digestion, or Maturation; as in Drinks and Fruits. If the Spirits be not meerly detained, but Protrude a little and that Motion be confused, and inordinate, there followeth Putrefaction; Which ever dissolveth the Consistence of the Body into much inequality; as in Flesh, Rotten Fruits, Shining Wood, &c. And also in the Rust of Metals. But if that Motion be in a certain Order, there followeth Vivification, and Figuration; as both in Living Creatures bred of Putrefaction, and in Living Creatures Perfect. But if the Spirits issue out of

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the Body, there followeth *Deficcation, Induration, Consumption, &c.* As in *Brick*, evaporation of *Bodies Liquid, &c.*

329 The *Meanes* to *Enduce* and *Accelerate Putrefaction*, are; First by *Adding* some *Crude* or *Watry Moisture*; as in *Wetting* of any *Flesh, Fruit, Wood,* with *Water, &c.* For contrariwise *Unctuous* and *Oily Substances* preserve.

330 The Second is by *Invitation* or *Excitation*; as when a *Rotten Apple* lieth close to another *Apple* that is found: Or when *Dung* (which is a substance already *Putrified*) is added to other *Bodies*. And this is also notably seen in *Church-yards*, where they bury much; where the *Earth* will consume the *Corps*, in farre shorter time, than other *Earth* will.

331 The third is by *Glosseness* and *Stopping*, which detaineth the *Spirits*, in *Prison*, more then they would; and thereby irritateth them to seek *Issue*; as in *Corn* and *Clothes* which wax *Musty*; and therefore open *Air* (which they call *Aer perflabilis*) doth preserve: And this doth appear more evidently in *Agues*, which come (most of them) of *Obstructions* and *Penning* the *Humours*, which thereupon *Putrifie*.

332 The Fourth is, by *Solution of Continuity*; as we see an *Apple* will rot sooner, if it be cut or pierced, and so will *wood, &c.* And so the *flesh* of *Creatures* alive where they have received any wound.

333 The Fifth is, either by the *Exhaling*, or by the *Driving back* of the *Principall Spirits*, which preserve the *Consistence* of the *Body*; so that when their *Government* is dissolved every *Part* returneth to his *Nature*, or *Homogeny*. And this appeareth in *Urine* and *Blood*, when they coole and thereby break. It appeareth also in the *Gangreen*, or *Mortification* of *Flesh*, either by *Opiates*, or by *Intense Colds*. I conceive also the same effect is in *Pestilences*, for that the *Malignity* of the *Infecting vapour*, daunteth the *Principall Spirits*, and maketh them fly, and leave their *Regiment*; and then the *Humours, Flesh,* and *Secondary Spirits*, do dissolve and break, as in an *Anarchy*.

334 The Sixth is, when a *Forraigne Spirit*, *Stronger* and *more Eager* than the *Spirit* of the *Body*, entreth the *Body*; as in the *stinging* of *Serpents*. And this is the *Cause* (generally) that upon all *Poysons* followeth *Swelling*: and we see *Swelling* followeth also, when the *Spirits*, of the *Body* it self, Congregate too much; As upon *Blowes*, and *Bruises*; or when they are *Pent in too much*, as in *Swelling* upon *Cold*. And we see also that the *Spirits* coming of *Putrefaction* of *Humors* in *Agues, &c.* Which may be counted as *Forreign Spirits*; though they be bred within the *Body* do extinguish and Suffocate the *Natural Spirits*, and *Heat*.

335 The Seventh is, by such a *weak Degree* of *Heat*, as setteth the *Spirits* in a *little Motion*, but is not able either to digest the *Parts*, or to *Issue* the *Spirits*; as is seen in *Flesh* kept in a *Room* that is not *Coole*; Whereas in a *Coole*, and *Wet Larder* it will keep longer. And we see, that *Vivification* (whereof *Putrefaction* is the *Bastard Brother*;) is effected by such soft *Heats*; as the hatching of *Eggs*; the heat of the *Womb, &c.*

336 The Eighth is, by the *Releasing* of the *Spirits*, which before were *Close* kept by the *Solidness* of their *Coverture*, and thereby their *Appetite* of *Issuing* checked; as in the *Artificiall Rusts* induced by strong *Waters* in *Iron, Lead, &c.* And therefore *Wetting* hasteneth *Rust* or *Putrefaction* of any thing, because it softeneth the *Crust*, for the *Spirits* to come forth.

337 The Ninth is, by the *Enterchange* of *Heat* and *Cold*, or *Wet* and *Dry*; as we see in the *Mouldring* of *Earth* in *Frosts*, and *Sunne*; and in the more hasty *Rotting* of *Wood*, that is sometimes *wet*, sometimes *dry*.

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The Tenth is, by *Time*, and the *Work* and *Procedure* of the *Spirits* themselves; which cannot keep their Station; Especially if they be left to themselves, and there be not Agitation or Locall Motion. As we see in Corn not stirred; And Mens Bodies not exercised.

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All *Moulds* are Inceptions of *Putrefaction*; as the *Moulds* of *Pyes*, and *Flesh*; the *Moulds* of *Orenger*, and *Limmons*; which *Moulds* afterwards turn into *Worms*, or more odious *Putrefactions*: And therefore (commonly) prove to be of ill odour. And if the Body be *Liquid*, and not apt to putrifie totally, it will cast up a *Mother* in the Top; as the *Mothers* of *Distilled Waters*.

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Mosse is a kind of *Mould*, of the Earth and Trees. But it may be better sorted as a *Rudiment* of *Germination*; To which we referre it.

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It is an *Enquiry* of Excellent use, to Enquire of the *Means* of *Preventing* or *Staying* of *Putrefaction*; For therein consisteth the *Means* of *Conseruation* of *Bodies*; For *Bodies* have two *Kinds* of *Dissolutions*; The one by *Consumption*, and *Deficoation*; The other by *Putrefaction*. But as for the *Putrefactions* of the *Bodies* of *Men*, and *Living Creatures* (as in *Agues*, *Worms*, *Consumptions* of the *Lungs*, *Impostums*, and *Ulcers* both *Inwards* and *Outwards*) they are a great *Part* of *Physick*, and *Surgery*; And therefore we will reserve the *Enquiry* of them to the proper Place, where we shall handle *Medicinall Experiments* of all *Sorts*. Of the rest we will now Enter into an *Enquiry*: wherein much light may be taken, from that which hath been said, of the *Means* to *Enduce* or *Accelerate Putrefaction*: For the *Removing* that, which caused *Putrefaction*, doth prevent and avoid *Putrefaction*.

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in Confort
touching Pro-
hibiting and
Preventing
Putrefaction.

The first *Means* of *Prohibiting* or *Checking Putrefaction* is *Cold*: For so we see that *Meat* and *Drink* will last longer, *Unputrified*, or *Unfowred*, in *Winter*, than in *Summer*: And we see that *Flowers*, and *Fruits*; put in *Conservatories* of *Snow*, keep fresh. And this worketh by the *Detention* of the *Spirits*, and *Constipation* of the *Tangible Parts*.

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The Second is *Astriction*: For *Astriction* prohibiteth *Dissolution*: As we see (generally) in *Medicines*, whereof such as are *Astringents* do inhibit *Putrefaction*: And by the same reason of *Astringency*, some small Quantity of *Oyl* of *Vitrioll*, will keep *Fresh Water* long from *Putrifying*. And this *Astriction* is in a Substance that hath a *Virtuall Cold*; And it worketh (partly) by the same *Means* that *Cold* doth.

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The Third is, the *Excluding* of the *Air*; And again, the *Exposing* to the *Air*: For these *Contraries*, (as it cometh often to passe,) work the same Effect, according to the Nature of the *Subject-Matter*. So we see, that *Beer*, or *Wine*, in *Bottles* close stopped, last long; That the *Garners* under *Ground* keep *Corn* longer than those above *Ground*; And that *Fruit* closed in *Wax* keepeth fresh: And likewise *Bodies* put in *Honey*, and *Flower*, keep more fresh: And *Liquors*, *Drinks*, and *Juices*, with a little *Oyl* cast on the Top, keep fresh. Contrariwise, we see that *Cloth* and *Apparell*, not *Aired*, do breed *Moaths*, and *Mould*; and the *Diversity* is, that in *Bodies*

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that need *Detention* of *Spirits*, the *Exclusion* of the *Air* doth good; As in *Drinks*, and *Corn*: But in *Bodies* that need *Emission* of *Spirits* to discharge some of the *Superfluous Moisture*, it doth hurt, for they require *Airing*.

344 The fourth is *Motion*, and *Stirring*; For *Putrefaction* asketh *Rest*; For the *Subtill Motion*, which *Putrefaction* requireth, is disturbed by any *Agitation*, and all *Locall Motion* keepeth *Bodies* Integrall, and their parts together; as we see, that *Turning over* of *Corn* in a *Garner*, or *Letting* it run like an *Houre-glass*, from an upper *Room* into a lower, doth keep it sweet: And *Running Waters* putrifie not: And in *Mens Bodies*, *Exercise* hindreth *Putrefaction*; and contraywise *Rest*, and want of *Motion*, or *stoppings*; (whereby the *Running* of *Humours*, or the *Motion* of *Perspiration*, is stayed,) further *Putrefaction*; as we partly touched a little before.

345 The Fifth is, the *Breathing forth* of the *Adventitious Moisture* in *Bodies*, for as *Wetting* doth hasten *Putrefaction*; so *Convenient drying*, (whereby the more *Radicall Moisture* is only kept in,) putteth back *Putrefaction*: So we see that *Herbs*, and *Flowers*, if they be dried in the *shade*; or dried in the hot *Sunne*, for a small time, keep best. For the *Emission* of the *Loose* and *Adventitious Moisture*, doth betray the *Radicall Moisture*; and carryeth it out for *Company*.

346 The Sixth is, the *Strengthening* of the *Spirits* of *Bodies*; For as a *Great Heat* keepeth *Bodies* from *Putrefaction*; but a *Temperate Heat* enclineth them to *Putrefaction*: So a strong *Spirit* likewise preserveth, and a *Weak* or *Faint Spirit* disposeth to *Corruption*. So we find that salt water corrupteth not so soon as fresh: And salting of *Oysters*, and powdring of *Meat*, keepeth them from *Putrefaction*. It would be tried also, whether *Chalk*, put into *Water*, or *Drink*, doth not preserve it from *Putrifying*, or speedy *Souring*. So we see that *Strong Beer* will last longer than small, and all things, that are *Hot* and *Aromaticall*, do help to preserve *Liquors*, or *Powders*, &c. Which they do, as well by strengthening the *Spirits*, as by soaking out the loose *Moisture*.

347 The Seventh is, *Separation* of the *Cruder Parts*, and thereby making the *Body* more *Equall*; for all unperfect *Mixture* is apt to *Putrifie*; And *Warry Substances* are more apt to *Putrifie*, than *Oily*. So we see *Distilled Waters* will last longer than *Raw Waters*; and things that have passed the *Fire*, do last longer than those that have not passed the *Fire*; as *Dried Pears*, &c.

348 The Eighth is, the *Drawing forth continually* of that part, where the *Putrefaction* beginneth: Which is (commonly) the *Loose* and *Vvetry Moisture*; Not only for the Reason before given, that it provoketh the *Radicall Moisture* to come forth with it; but because being detained in the *Body*, the *Putrefaction* taking hold of it, infecteth the rest: As we see in the *Embalming* of *dead Bodies*: And the same Reason is of *Preserving Herbs*, or *Fruits*, or *Flowers*, in *Branne*, or *Meale*.

349 The Ninth is, the *Commixture* of any Thing that is more *Oily*, or *Sweet*: For such *Bodies* are least apt to *Putrifie*; the *Air* working little upon them; and they not *putrifying* preserve the rest. And therefore we see *Syrups* and *Ointments*, will last longer, than *Juyces*.

350 The Tenth is, the *Commixture* of somewhat that is *Drie*; For *Putrefaction* beginneth first from the *spirits*; and then from the *Moisture*: And that that is *dry*, is unapt to *putrifie*: And therefore *Smock* preserveth *flesh*; as we see in *Bacon*, and *Neats-Tongues*, and *Martlemas Beef*, &c.

The Opinion of some of the *Ancients*, that *Blown Aires* do preserve Bodies, longer than other *Aires*, seemeth to Me Probable; For that the *Blown Aires*, being Over-charged and Compressed, will hardly receive the Exhaling of any Thing; but rather repulse it. It was tried in a *Blown Bladder*, whereinto Flesh was put, and likewise a Flower, and it sorted not: For *Dry Bladders* will not *Blow*, and *New Bladders* rather further *Putrefaction*: The way were therefore, to blow strongly, with a Paire of Bellows, into a Hogthead, putting into the Hogthead (before) that which you would have preserved; and in the instant that you withdraw the Bellows, stop the Hole close.

THe Experiment of Wood that shineth in the Dark, we have diligently driven, and pursued: The rather, for that of all things, that give light here below, it is the most Durable, and hath least Apparent Motion. Fire and Flame are in continual Expence; Sugar shining only while it is in Scraping; and Salt-Water while it is in Dashing; Glo-worms have their shining while they live, or a little after; Onely Scales of Fishes (Putrefied) seem to be of the same Nature with shining-Wood: And it is true, that all Putrefaction hath with it an Inward Motion, as well as Fire, or Light. The Triall sorted thus. 1. The shining is in some Pieces more Bright, in some more Dimme; but the most Bright of all doth not attain to the Light of a Glo-worm. 2. The Woods that have been tried to shine, are chiefly Sallow, and Willow; also the Ash, and Hasle; It may be, it holdeth in others. 3. Both Roots, and Bodies do shine, but the Roots better. 4. The Colour of the shining Part, by Day-light, is in some Pieces White, in some Pieces inclining to Red; Which in the Country they call the White, and Red Carret. 5. The Part that shineth, is, (for the most Part) somewhat soft, and Moist to feel to; But some was found to be Firme and Hard; so as it might be figured into a Cross, or into Beads, &c. But you must not look to have an Image, or the like in any Thing that is Lightsome; For even a face in Iron red Hot will not be seen, the Light confounding the small differences of lightsome and Darksome, which shew the figure. 6. There was the shining Part pared off, till you came to that, that did not shine; But within two days the Part Contiguous began also to shine, being laid abroad in the Dew; so as it seemeth the Putrefaction spreadeth. 7. There was other dead Wood of like kinde, that was Laid abroad, which shined not at the first; But after a Nights lying abroad began to shine. 8. There was other Wood, that did First shine; and being laid dry in the House, whithin five or six days, Lost the shining; and laid abroad again, Recovered the shining. 9. shining Woods, being laid in a Dry Room, within a seven night, lost their shining; but being laid in a Cellar, or Dark Room, kept the shining. 10. The Boring of Holes, in that kind of Wood, and then laying it abroad, seemeth to conduce to make it shine: The Cause is, for that all Solution of Continuity doth help on Putrefaction, as was touched before. 11. No Wood hath been yet tried to Shine, that was cut down alive, but such as was Rooted, both in Stock, and Root, while it grew. 12. Part of the Wood that Shined, was steeped in Oyl, and retained the Shining a Fortnight. 13. The like succeeded in some steeped in Water, and much better. 14. How long the shining will continue, if the Wood be laid abroad every Night, and taken in and sprinkled with Water in the Day, is not yet tried. 15. Triall was made of laying it abroad in Frosty weather, which hurt it not. 16. There was a great Piece of a Root, which did shine, and the shining Part was Cut-off, till no more shined;

Experiment
Solitary, touch-
ing Wood
Shining in the
Dark

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Shined; Yet after two Nights, though it were kept in a drie Room, it got a *Shining*.

Experiment
Solitary, touch-
ing the Ac-
celeration of
Birth.

353

THE *Bringing forth of Living Creatures* may be *Accelerated* in two Re-
spects: The one, if the *Embryon* ripeneth and perfecteth sooner. The
other, if there be some Cause from the *Mothers Body*, of *Expulsion* or Put-
ting it down. Whereof the Former is good, and argueth Strength; The
Latter is ill, and cometh by Accident or Disease. And therefore the An-
cient Observation is true, that the *Child born in the seventh Moneth*, doth
commonly well; But *Born in the Eight Moneth*, doth (for the most part)
die. But the Cause assigned is Fabulous; Which is, that in the Eighth
Moneth, should be the return of the Reign of the Planet Saturn: which (as
they say) is a Planet Maligne; whereas in the Seventh is the Reign of the
Moon, which is a Planet Propitious. But the true Cause is, for that where
there is so great a Prevention of the Ordinary time, it is the *lustiness* of the
Child; But when it is less, it is some *indisposition* of the Mother.

Experiment
Solitary, touch-
ing the Ac-
celeration of
Growth and
Stature.

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TO *Accelerate Growth or Stature*, it must proceed; Either from the Plen-
ty of the *Nourishment*; Or from the Nature of the *Nourishment*; Or from
the *Quickning* and *Exciting* of the *Natural Heat*. For the first, *Excess* of
Nourishment is hurtfull; For it maketh the Child Corpulent; and Grow-
ing in Breadth, rather than in Height. And you may take an Experiment
from *Plants*, which, if they spread much, are seldome tall. As for the Na-
ture of the *Nourishment*; First, it may not be too Drie; and therefore Chil-
dren in Dayrie Countries do wax more tall, than where they feed more
upon Bread, and Flesh. There is also a received Tale; That boyling
of *Dasie Roots* in *Milk* (which it is certain are great Driers) will make *Dogs*
little. But so much is true, that an *Over-Drie Nourishment* in Childhood
putteth back Stature. Secondly, the *Nourishment* must be of an *Opening*
Nature; For that *Attenuateth* the Juyce, and furthereth the Motion of the
Spirits, upwards. Neither is it without cause, that *Xenophon*, in the *Nourri-*
ture of the Persian Children, doth so much commend their Feeding upon
Cardamon; which (he saith) made them grow better, and be of a more
Active Habit. *Cardamon* is in Latine *Nasturtium*; and with us *Water-Cresses*;
Which, it is certain, is an Herb, that whilst it is young, is Friendly to
Life. As for the *Quickning* of *Natural Heat*, it must be done chiefly with
Exercise; and therefore (no doubt) much Going to School, wherethey
sit so much, hindereth the *Growth* of *Children*; whereas *Country-People*,
that go not to School, are commonly of better Stature. And again, Men
must beware how they give *Children*, any thing that is Cold in Operation;
even *Long Sucking* doth hinder both *Wit*, and *Stature*. This hath been try-
ed, that a Whelp, that hath been fed with *Nitre* in *Milk*, hath become ve-
ry little, but extream lively. For the *Spirit* of *Nitre* is Cold. And though
it be an Excellent Medicine, in strength of years, for Prolongation of Life;
yet it is, in Children and young Creatures, an Enemy to *Growth*. And all
for the same Reason; For *Heat* is requisite to *Growth*: But after a Man is
come to his Middle Age, *Heat* consumeth the *Spirits*; which the Coldnesse
of the *Spirit* of *Nitre* doth help to condence, and correct.

There be two Great Families of Things; You may terme
them by severall Names; *Sulphureous* and *Mercureall*, which are
the *Chymists* Words: (For as for their *Salt*, which is their Third
Principle,

Experiments
in Confort
touching Sul-
phur and Mer-
cury, two of
Paracelsus
Principles.

Principle; it is a Compound of the other two;) *Inflammable*, and *Not Inflammable*; *Mature* and *Crude*; *Oily* and *Watry*. For we see that in *Subterraneies* there are, as the *Fathers* of their *ribes*, *Brimstone* and *Mercury*; In *Vegetables*, and *Living Creatures* there is *Water* and *Oyl*: In the *Inferiour Order* of *Pneumatics* there is *Air* and *Flame*: And in the *Superiour*, there is the *Body* of the *Star*, and the *Pure Skey*. And these *Paires*, though they be unlike in the *Primitive Differences* of *Matter*, yet they seem to have many *Consents*: For *Mercury* and *Sulphure* are principall *Materials* of *Metals*: *Water* and *Oyl*, are principall *Materials* of *Vegetables*, and *Animals*; And seem to differ but in *Maturation*, or *Concoction*: *Flame* (in *Vulgar Opinion*) is but *Air Incensed*; And they both have *Quickness* of *Motion*, and *Facility* of *Cession*, much alike: And the *Interstellar Skey*, (though the *Opinion* be vain, that the *Star* is the *Denser Part* of his *Orbe*,) hath notwithstanding so much *Affinity* with the *Star*, that there is a *Rotation* of that, as well as of the *Star*. Therefore, it is one of the greatest *Magnalia Naturæ*, to turn *Water* or *Watry Juyce* into *Oyl* or *Oily Juyce*: Greater in *Nature*, than to turn *Silver*, or *Quick-Silver*, into *Gold*.

The *Instances* we have, wherein *Crude* and *Watry Substance* turneth into *Fat* and *Oily*, are of four *kindes*. First in the *Mixture* of *Earth* and *Water*; which mingled by the help of the *Sun*, gathered a *Nitrous Fatness*, more than either of them have severally; As we see, in that they put forth *Plants*, which need both *Juyces*.

The *Second* is in the *Affimilation* of *Nourishment*, made in the *Bodies* of *Plants*, and *Living Creatures*; Whereof *Plants* turn the *Juyce* of meer *Water* and *Earth*, into a great deal of *Oily Matter*: *Living Creatures*, though much of their *Fat*, and *Flesh*, are out of *Oily Aliments*, (as *Meat*, and *Bread*,) yet they *Affimilate* also in a *Measure* their *Drink* of *Water*, &c. But these two *Wayes* of *Version* of *Water* into *Oyl*, (namely by *Mixture* and by *Affimilation*) are by many *Passages*, and *Percolations*, and by long *Continuance* of soft *Heats*, and by *Circuits* of *Time*.

The *third* is in the *Inception* of *Putrefaction*; as in *Water Corrupted*; and the *Mothers* of *Waters Distilled*; Both which have a kind of *Fatness*, or *Oyl*.

The *fourth* is in the *Dulcoration* of some *Metals*; as *Saccharum Saturni*, &c.

The *Intension* of *Version* of *Water* into a more *Oily Substance*, is by *Digestion*; For *Oyl* is almost *Nothing* else but *Water Digested*; and this *Digestion* is principally by *Heat*; Which *Heat* must be either *Outward*, or *Inward*: Again, it may be by *Provocation*, or *Excitation*; Which is caused by the *Mingling* of *Bodies* already *Oily*, or *Digested*; For they will somewhat *Communicate* their *Nature* with the rest. *Digestion* also is strongly effected by direct *Affimilation*, of *Bodies Crude* into *Bodies Digested*; as in *Plants*, and *Living Creatures*, whose *Nourishment* is far more *Crude* than their *Bodies* dies:

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dies: But this *Digestion* is by a great *Compassse*, as hath been said. As for the more full handling of these two Principles, whereof this is but a taste; (the Enquiry of which is one of the Profoundest Enquiries of Nature,) We leave it to the Title of *Version of Bodies*; and likewise to the Title of the *First Congregations of Matter*; Which like a Generall Assembly of Estates, doth give Law to all Bodies.

Experiment
Solitary, touch-
ing *Chamelions*
ons.

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A *Chamelion* is a Creature about the Bignesse of an Ordinary *Lizard*; His Head unproportionably bigge; His eyes great: He moveth his Head without the writhing of his Neck; (which is inflexible,) as a *Hogge* doth: His Back crooked; His Skinne spotted with little Tumours, less Eminent nearer the Belly; His Tail slender, and long: On each Foot he hath five Fingers; three on the Outside, and two on the Inside; His Tongue of a marvellous Length, in respect of his Body, and hollow at the end; which he will lanch out to prey upon *Flies*. Of Colour Green and of a dusky Yellow, brighter and whiter towards the Belly; yet spotted with Blew, White, and Red. If he be laid upon Green, the Green predominateth; If upon Yellow, the Yellow; Not so, if he be laid upon Blew, or Red, or White; Only the Green spots receive a more Orient Lustre; Laid upon Black, he looketh all Black, though not without a Mixture of Green. He feedeth not only upon Air, (though that be his Principal Sustenance;) for sometimes he taketh *Flies*, as was said; yet some that have kept *Chamelions* a whole year together, could never perceive that ever they fed upon any Thing else but Air; and might observe their Bellies to swell after they had exhausted the Air, and closed their Jaws; which they open commonly against the Rayes of the Sun. They have a foolish Tradition in *Magick*, that if a *Chamelion* be burnt upon the Top of an House, it will raise a Tempest, Supposing (according to their vain Dreams of *Sympathies*) because he nourisheth with Air, his Body should have great vertue to make Impression upon the Air.

Experiment
Solitary, touch-
ing *Subterrany Fires*.

361

IT is reported by one of the *Ancients*, that in Part of *Media*, there are *Eruptions* of *Flames* out of *Plaines*; and that those *Flames* are clear, and cast not forth such smoak, and ashes, and Pumice, as *Mountain Flames* do. The Reason (no doubt) is, because the Flame is not pent, as it is in *Mountains*, and *Earthquakes* which cast *Flame*. There be also some *Blind Fires*, under *Stone*, which flame not out, but *Oyl* being poured upon them, they flame out. The Cause whereof is, for that it seemeth, the *Fire* is so choaked, as not able to remove the *Stone*, it is *Heat* rather than *Flame*; Which nevertheless is sufficient to Enflame the *Oyl*.

Experiment
Solitary, touch-
ing *Nitre*.

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IT is reported, that in some *Lakes*, the *Water* is so *Nitrous*, as if *Foule Cloaths* be put into it, it scoureth them of it self: And if they stay any whit long, they moulder away. And the scouring Vertue of *Nitre* is the more to be noted, because it is a *Body Gold*; and we see *Warm Water* scoureth better than *Cold*. But the Cause is, for that it hath a Subtill spirit, which severeth and divideth any thing that is foule, and Viscous, and sticketh upon a Body:

Experiment
Solitary, touch-
ing *Congel-
ing of Air*.

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TAKE a *Bladder*, the greatest you can get; Fill it full of *Wind*, and tye it about the Neck with a *Silk thred* waxed; and upon that likewise *Wax* very close; So that when the Neck of the *Bladder* drieth, no *Air* may possibly get in nor out. Then bury it three or foure foot under the *Earth*, in a *Vault*, or in a *Conservatory of Snow*, the *Snow* being made hollow about the *Bladder*;

Bladder; And after some Fortnights distance, see whether the *Bladder* be shrunk: For if it be, then it is plain, that the *Coldnesse* of the *Earth* or *Snow*, hath Condensed the *Air*, and brought it a Degree nearer to *Water*: Which is an *Experiment* of great Consequence.

IT is a Report of some good credit, that in *Deep Caves*, there are *Tenfile Chrystall*, and *Degrees of Chrystall* that drop from above; and in some other, (though more rarely) that rise from below. Which though it be chiefly the Work of Cold; yet it may be, that *Water*, that passeth thorow the *Earth*, gathereth a Nature more clammy, and fitter to Congeale, and become Solid, than *Water* of it self. Therefore *Triall* would be made, to lay a Heap of *Earth*, in great *Frosts*, upon a *Hollow Vessell*, putting a *Canvase* between, that it falleth not in: And poure *Water* upon it, in such *Quantity* as will be sure to soak thorow; and see whether it will not make an harder *Ice* in the bottome of the *Vessell*, and less apt to dissolve, than ordinarily. I suppose also, that if you make the *Earth* narrower at the bottome, than at the top, in fashion of *Sugar Loafe Reversed*, it will help the *Experiment*. For it will make the *Ice*, where it issueth, less in Bulk; and evermore smalness of *Quantity* is a help to *Version*.

TAKE *Damask Roses*, and pull them; then drie them upon the Top of an *House*, upon a *Lead* or *Tarras*, in the *Hot Sun*, in a clear day, between the hours (only) of twelve and two, or thereabouts. Then put them into a *Sweet Drie Earthen Bottle*, or a *Glasse* with narrow Mouthes, stuffing them close together, but without Bruising: Stop the *Bottle*, or *Glass*, close, and these *Roses* will retain, not only their *Smell* Perfect, but their *Colour* fresh, for a year at least. Note, that Nothing doth so much destroy any *Plant*, or other body, either by *Putrefaction*, or *Arefaction*, as the *Adventitious Moisture*, which hangeth loose in the *Body*, if it be not drawn out. For it betrayeth and tolleth forth the *Innate* and *Radicall Moisture* along with it, when it self goeth forth. And therefore in *Living Creatures*, Moderate *Sweat* doth preserve the *Juyce* of the *Body*. Note that these *Roses*, when you take them from the *Drying*, have little or no *Smell*; so that the *Smell* is a *Second Smell*, that issueth out of the *Flower* afterwards.

THE *Continuance of Flame*, according unto the diversity of the *Body Enflamed*, and other Circumstances, is worthy the Enquiry; Chiefly, for that though *Flame* be (almost) of a *Momentany Lasting*, yet it receiveth the *More*, and the *Less*: we will first therefore speake (at large) of *Bodies Enflamed*, wholly, and Immediately, without any *Wicke* to help the *Inflammation*. A *Spoonfull of Spirit of Wine*, a little heated, was taken, and it burnt as long as came to 116. *Pulses*. The same *Quantity of Spirit of Wine*, Mixed with the *Sixth Part* of a *Spoonfull of Nitre* burnt but to the space of 94. *Pulses*. Mixed with the like *Quantity of Bay-Salt*, 83. *Pulses*. Mixed with the like *Quantity of Gunpowder*, which dissolved into a *Black water*, 110. *Pulses*. A *Cube*, or *Pellet of Tellow Wax*, was taken, as much as half the *Spirit of Wine*, and set in the *Middest*, and it burnt only to the space of 87. *Pulses*. Mixed with the *Sixth Part* of a *Spoonfull of Milk*, it burnt to the space of 100. *Pulses*; And the *Milk* was crudled. Mixed with the *Sixth Part* of a *Spoonful of Water*, it burnt to the space of 86. *Pulses*; With an *Equall Quaintity of Water*, onely to the space of 4. *Pulses*. A small *Pebble* was laid in the *Middest*, and the *Spirit of Wine* burnt to the space of 94. *Pulses*.

Experiment Solitary, touching Congealing of Water into Chrystall.

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Experiment Solitary, touching Preserving of Rose Leaves both in Colour and Smell.

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Experiments in Confire touching the Continuance of Flame.

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Pulses. A Piece of Wood of the Bignesse of an Arrow, and about a Fingers length, was set up in the Middelst, and the Spirit of Wine burnt to the space of 94 Pulses. So that the Spirit of Wine Simple, endureth the longest; and the Spirit of Wine with the Bay-salt, and the Equall Quantity of Water, were the shortest.

367 Consider well, whether the more speedy going forth of the Flame, be caused, by the Greater Vigour of the Flame in Burning; Or by the Resistance of the Body mixed, and the Aversion thereof to take Flame: Which will appear by the Quantity of the Spirit of Wine, that remaineth after the going out of the Flame. And it seemeth clearly to be the latter; For that the Mixture of Things least apt to burn, is the Speediest in going out, and note, by the way, that Spirit of Wine burned, till it go out of it self, will burn no more; and tasteth nothing so hot in the Mouth as it did; No nor yet fowre, (as if it were a degree towards Vinegar,) which Burnt Wine doth; but flat and dead.

368 Note, that in the Experiment of Wax aforesaid, the Wax dissolved in the burning, and yet did not incorporate it self, with the Spirit of Wine, to produce one Flame; but wheresoever the Wax floated, the Flame forsook it; till at last it spread all over, and put the Flame quite out.

369 The Experiments of the Mixtures of the Spirit of Vine enflamed, are things of discovery, and not of Use: But now we will speak of the Continuance of Flames, such as are used for Candles, Lamps, or Tapers, consisting of Inflamable Matters, and of a Wick that provoketh Inflammation. And this importeth not only Discovery, but also Use and Profit; For it is a great Saving in all such Lights, if they can be made as fair and right as others, and yet last longer. Wax Pure made into a Candle, and Wax Mixed severally into Candle stuff, with the Particulars that follow; (viz. Water, Aqua-vitæ, Milk, Bay-salt, Oyl, Butter, Nitre, Brimstone, Saw-dust,) Every of these bearing a Sixth Part to the Wax; and every of these Candles Mixed, being of the same Weight and Wick, with the Wax Pure, proved thus in the Burning, and Lasting. The Swiftest in Consuming was that with Saw-dust; Which first burned fair till some Part of the Candle was Consumed, and the Dust gathered about the Snafte; but then it made the Snafte big, and long, and to burn dusky, and the Candle wasted in half the time of the Wax Pure. The next in Swiftnes, were the Oyl, and Butter, which consumed, by a Fifth part, swifter than the Pure Wax. Then followed in Swiftnes the Clear Wax it self. Then the Bay-Salt, which lasted about an Eighth part longer than the Clear Wax. Then followed the Aqua-vitæ, which lasted about a Fifth part longer than the Clear Wax. Then follow the Milk and Water, with little difference from the Aqua-vitæ, but the Water slowest. And in these four last, the Wick would spit forth little sparks. For the Nitre, it would not hold lighted above some Twelve Pulses: But all the while it would spit out Portions of Flame, which afterwards would go out into a vapour. For the Brimstone, it would hold lighted, much about the same with the Nitre; But then after a little while, it would harden and cake about the Snafte; so that the Mixture of Bay-Salt with Wax, will winne an Eighth part of the time of lasting, and the Water a Fifth.

370 After the several Materials were tried, Triall was likewise made of severall Wicks; as of ordinary Cotten, Sowing Thred, Rush, Silk, Straw, and Wood. The Silk, Straw, and Wood, would flame a little, till they came to the Wax, and then go out; Of the other Three, the Thred consumed faster than the Cotten, by a sixth part of Time: The Cotten next: Then the Rush consumed

sumed flower than the *Cotton*, by at least a third part of time. For the *Big-nelle* of the *Flame*, the *Cotton*, and *Thred*, cast a *Flame* much alike; and the *Rush* much lesse and dimmer. *Quere* whether *VWood*, and *Wicker* both, as in *Torches* consume faster, than the *Wicker Simple*?

We have spoken of the severall *Materialls*, and the severall *Wicks*: But to the lasting of the *Flame*, it importeth also; not only what the *Materiall* is, but in the same *Materiall*, whether it be *Hard*; *Soft*; *Old*; *New*; &c. Good *Huswives*, to make their *Candles* burn the longer, use to lay them (one by one) in *Bran* or *Flower*, which make them harder, and so they consume the flower. Insomuch, as by this meanes they will out-last other *Candles* of the same stuffe, almost halfe in halfe. For *Bran* and *Flower* have a *Virtue* to harden; so that both *Age*, and lying in the *Bran*, doth help to the lasting. And we see that *Wax Candles* last longer then *Tallow Candles*, because *wax* is more firm and hard.

The *Lasting* of *Flame* also dependeth upon the easie *Drawing* of the *Nourishment*; as we see in the *Court* of *England*, there is a service which they call *All-Night*; which is (as it were) a great *Cake* of *wax*, with the *wicke* in the *Middelt*; whereby it cometh to passe, that the *wicke* fetcheth the *Nourishment* further off. We see also that *Lamps* last longer, because the *Vessel* is farre broader, than the breadth of a *Taper* or *Candle*.

Take a *Turreted Lamp* of *Tinne*, made in the forme of a *Square*; The *Height* of the *Turret* being thrice as much, as the length of the lower part, whereupon the *Lamp* standeth: Make only one hole in it, at the end of the *Return* furthest from the *Turret*. Reverse it and fill it full of *Oile*, by that hole; and then set it upright again; and put a *Wick* in at the hole; and lighten it: You shall finde, that it will burn slow, and a long time: Which is caused, (as was said last before) for that the *Flame* fetcheth the *Nourishment* a farre off. You shall finde also, that as the *Oile* wasteth, and descendeth, so the top of the *Turret*, by little and little, filleth with *Aire*; which is caused by the *Rarefaction* of the *Oile* by the *Heat*. It were worthy the *Observation*, to make a hole, in the top of the *Turret*, and to trie, when the *Oile* is almost consumed, whether the *Aire* made of the *Oile*, if you put to it a *Flame* of a *Candle*, in the letting of it forth, will enflame. It were good also to have the *Lamp* made, not of *Tinne*, but of *Glasse*; that you may see how the *Vapour* or *Air* gathereth, by degrees in the top.

A *Fourth* point, that importeth the lasting of the *Flame*, is the *Closeness* of the *Aire*, wherein the *Flame* burneth. We see that if *VVind* bloweth upon a *Candle* it wasteth apace. We see also it lasteth longer in a *Lantern*, than at *large*. And there are *Traditions* of *Lamps* and *Candles*, that have burnt a very long time, in *Caves* and *Tombs*.

A *Fifth* point, that importeth the *Lasting* of the *Flame*, is the *Nature* of the *Aire* where the *Flame* burneth; whether it be *hot* or *cold*; *Moist* or *Drie*. The *Aire*, if it be very *Cold*, irritateth the *Flame*, and maketh it burn more fiercely; (as *Fire* scorseth in *Frosty* weather;) and so furthereth the *Consumption*. The *Air* once heated, (I conceive) maketh the *Flame* burn more mildly, and so helpeth the *Continuance*. The *Air*, if it be *Drie*, is indifferent: The *Aire*, if it be *Moist*, doth in a degree quench the *Flame*; (as we see *Lights* will go out in the *Damps* of *Mines*;) and howsoever maketh it burn more dully: And so helpeth the *Continuance*.

Burials in Earth serve for *Preservation*; And for *Condensation*; and for *Induration* of *Bodies*. And if you intend *Condensation* or *Induration*, you may

Experiments
in Confort
touching Bur-
ials or Infusions
of divers Bo-
dies in Earth.

may

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may bury the Bodies so, as *Earth* may touch them: as if you would make *Artificiall Procellane*, &c. And the like you may do for *Conservation*, if the Bodies be hard and solide; as *Clay*, *Wood*, &c. But if you intend *Preservation* of Bodies, more soft and tender, then you must do one of these two: Either you must put them in *Cases*; whereby they may not touch the *Earth*; Or else you must *Vault* the *Earth*, whereby it may hang over them, and not touch them; For if the *Earth* touch them, it will do more hurt, by the *Moisture*, causing them to putrifie, than good by the virtual *Cold*, to conserve them; Except the *Earth* be very *Dry*, and *Sandy*.

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An *Orange*, *Limmon*, and *Apple*, wrapt in a *Linning Cloth*, being buried for a *Fortnight* Space, foure Foot deep within the *Earth*, though it were in a *Moist Place*, and a *Rainy Time*, yet came forth, no wayes mouldy, or *Rotten*, but were become a little harder than they were; Otherwise fresh in their *Colour*; But their *Juyce* somewhat flatted. But with the *Burial* of a *Fortnight* more they become *Putrified*.

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A *Bottle of Beer* buried in like manner as before; became more lively, better tasted and clearer, than it was. And a *Bottle of Wine* in like manner. A *Bottle of Vinegar*, so buried, came forth more lively, and more *Odoriferous*, smelling almost like a *Violet*. And after the whole months *Buriall*, all the Three came forth, as fresh and lively, if not better than before.

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It were a profitable *Experiment*, to preserve *Oranges*, *Limmons*, and *Pomgranates*, till *Summer*; for then their price will be mightily encreased, This may be done, if you put them in a *Pot* or *Vessell*, well covered, that the *Moisture* of the *Earth* come not at them; Or else by putting them in a *Conservatory of Snow*. And generally, whosoever will make *Experiments* of *Cold*, let him be provided of three Things; A *conservatory of Snow*; A good large *Vault* twenty foot or least under the *Ground*; And a *Deep Well*.

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There hath been a *Tradition*, that *Pearl*, and *Corall*, *Surchois-Stone*, that have lost their *Colours*, may be recovered by *Burying* in the *Earth*: Which is a thing of great profit, if it would fort: But upon *Trial* of *Six Weeks Burial*, there followed no effect. It were good to trie it, in a *Deep Well*; Or in a *Conservatory of Snow*, where the *Cold* may be more *Constrigent*; And so make the *Body* more united, and thereby more resplendent.

Experiments
Solitary, touch-
ing the
Affects in Mens
Bodies from se-
veral Winds.

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MENS Bodies are heavier, and lesse disposed to Motion, when *Southerne Winds* blow, then when *Northern*. The Cause is, for that when the *Southern Winds* Blow, the *Humours* do (in some Degree) melt, and waxe fluide, and so flow into the Parts; as it is seen in *Wood*, and other Bodies, which when the *Southern Winds* blow, do swell. Besides, the Motion and Activity of the Body consisteth chiefly in the sinews, which, when the *Southern Wind* bloweth, are more relax.

Experiment
Solitary, touch-
ing Winter &
Summer Sick-
nesses.

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IT is commonly seen, that more are Sick in the *Summer*, and more Dye in the *Winter*; Except it be in *Pestilent Diseases*, which commonly raign in *Summer* or *Autumne*. The Reason is, because *Diseases* are bred (indeed) chiefly by *Heat*; But then they are cured most by *Sweat*, and *Purge*; which in the *Summer* cometh on, or is provoked, more Easily: As for *Pestilent Diseases*, the Reason why most Dye of them in *Summer*, is because they are bred most in the *Summer*; For otherwise those that are touched are in most danger in the *Winter*.

THe General opinion is, that *Years Hot and Moist*, are most *Pestilent*; Upon the Superficial Ground, that *Heat and Moisture* cause *Putrefaction*. In *England* it is found not true; for, many times, there have been great *Plagues* in *Dry Years*. Whereof the Cause may be, for that *Drought* in the Bodies of *Islanders*, habituate to *Moist Airs*, doth Exasperate the Humours, and maketh them more apt to *Putrifie*, or *Enflame*: Besides, it tainteth the *Waters* (commonly,) and maketh them less wholesome. And again in *Barbary*, the *Plagues* break up in the *Summer-moneths*, when the *Weather* is *Hot and Dry*.

Experiment
Solitary, touch-
ing *Pestilen-*
tiall *Seasons*.

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MAny *Diseases*, (both *Epidemicall*, and others) break forth at *Particular times*. And the Cause is fallly imputed to the *Constitution* of the *Air*, at that *Time*, when they break forth, or reign; whereas it proceedeth (indeed) from a *Precedent Sequence*, and *Series* of the *Seasons* of the *Year*: And therefore *Hippocrates*, in his *Prognosticks*, doth make good *Observations*, of the *Diseases*, that ensue upon the *Nature* of the *Precedent four Seasons* of the *Year*.

Experiment
Solitary, touch-
ing an *Er-*
rour received
about *Epidem-*
icall *Disea-*
ses.

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TRiall hath been made, with *Earthen Bottles*, well stopped, hanegd in a *Well* of *Twenty Fathom* deep, at the least; and some of the *Bottles* have been let down into the *Water*, some others have hanged above, with- in about a fathom of the *Water*; and the *Liquors* so tried have been, *Beer*, (not *New*, but ready for drinking) and *VVine*, and *Milk*. The *Proof* hath been, that both the *Beer*, and the *VVine*, (as well within *Water*, as above) have not been palled or deaded at all; but as good, or somewhat better than *Bottles* of the same *Drinks*, and *staleness*, kept in a *Celler*. But those which did hang above *Water*, were apparently the best; and that *Beer* did flower a little; whereas that under *Water* did not, though it were *Fresh*. The *Milk* sowerd, and began to *Putrifie*. Nevertheless it is true, that there is a *Village* near *Blots*, where in *Deep Caves* they do thicken *Milk*; in such sort, that it becometh very pleasant; Which was some Cause of this *Trial* of *Hanging Milk* in the *Well*: But, our *proof* was naught; neither do I know, whether that *Milk* in those *Caves*, be first boyled. It were good therefore to try it with *Milk Sudden*, and with *Creame*; for that *Milk* of it self is such a *Compound Body*, of *Creame*, *Crude*, and *VVhey*, as it is easily Turned, and Dissolved. it were good also to try the *Beer*, when it is in *Wort*, that it may be seen, whether the *Hanging* in the *Well*, will Accelerate the *Ripening* and *Clarifying* of it.

Experiment
Solitary
touching the
Alteration or
Preservation
of *Liquors* in
Wells, or deep
Vaults

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DIvers, we see, do *stut*. The Cause may be, (in most) the *Refrigeration* of the *Tongue*; Whereby it is less apt to move. And therefore we see, that *Naturalls* do generally *stut*: And we see that in those that *stut*: if they drink *Wine* moderately, they *stut* less, because it heateth: And so we see, that they that *stut*, do *stut* more in the first offer to speak, than in *Continuance*; Because the *Tongue* is, by *Motion*, somewhat heated. In some also, it may be, (though rarely) the *Dryness* of the *Tongue*; which likewise maketh it less apt to move, as well as *Cold*; for it is an *Affect* that cometh to some *Wise* and *Great Men*; as it did unto *Moses*, who was *Lingua Præputa*; and many *Stutters* (we find) are very *Cholerick Men*; *Choler* Enducing a *Dryness* in the *Tongue*.

Experiment
Solitary, touch-
ing *Stuttering*

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Smells

Experiments
in Confort
touching the
Smells.

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SSmells, and other Odours, are sweeter in the Air, at some Distance, than near the Nose; As hath been partly touched heretofore. The Cause is double: First the finer Mixture, or Incorporation of the Smell. For we see, that in Sounds likewise, they are sweetest, when we cannot hear every part by it self. The other Reason is, for that all Sweet Smells have joyned with them, some Earthy or Crude Odours; and at some distance the Sweet, which is the more Spiritual, is perceived; and the Earthy reacheth not so far.

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Sweet Smells are most forcible, in drie Substances, when they are Broken; and so likewise in Oranges, or Limmons, the Nipping off their Rinde, giveth out their Smell more: And generally, when Bodies are Moved or Stirred, though not Broken, they Smell more; as a sweet Bagge waved. The Cause is double: The one, for that there is a Greater Emission of the Spirit, when Way is made: And this holdeth in the Breaking, Nipping, or Crushing; It holdeth also, (in some degree) in the Moving: But in this last, there is a Concurrence of the second Cause; Which is the Impulsion of the Air, that bringeth the Sent faster upon us.

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The daintiest Smells of Flowers, are out of those Plants, whose Leaves smell not; As Violets, Roses, Wall-flowers, Gilly-flowers, Pincks, Wood-bine, Vine flowers, Apple-blooms, Lime-Tree-blooms, Beane-blooms, &c. The Cause is, for that where there is Heat and strength enough in the Plant, to make the Leaves Odorate, there the Smell of the Flower is rather Evanide and Weaker, than that of the Leaves; as it is in Rose-Mary-Flowers, Lavender-Flowers, and Sweet-Briar-Roses. But where there is less heat, there the Spirit of the Plant is digested and refined, and severed from the Grosser Juyce, in the Efflorescence, and not before.

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Most Odours smell best, Broken, or Crushed, as hath been said; but Flowers Pressed or Beaten, do lose the Freshness and Sweetness of their Odour. The Cause is, for that when they are Crushed, the Grosser and more Earthy Spirit cometh out with the Finer, and troubleth it; Whereas in stronger Odours there are no such degrees of the Issue of the Smell.

Experiments
in Confort
touching the
Goodness and
Choyce of
Water.

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IT is a Thing of very good Use, to discover the goodness of Waters. The Taste, to those that drink Water onely, doth somewhat: But other Experiments are more sure. First, try Waters by VVeights; wherein you may find some difference, though not much: And the Lighter, you may account the Better.

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Secondly, try them by Boiling upon an Equal Fire: And that which consumeth away fastest, you may account the Best.

Thirdly, try them in severall Bottles, or Open Vessels, Matches in every Thing else, and see which of them Last Longest, without Stench, or Corruption: And that which holdeth Unputrified longest, you may likewise account the Best.

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Fourthly, try them by Making Drinks, stronger, or smaller, with the same Quantity of Malt; and you may conclude, that that Water, which maketh the stronger Drink, is the more Concocted, and Nourishing; though perhaps it be not so good for Medicinall use. And such Water (commonly) is the VWater of Large and Navigable Rivers. And likewise in Large and Clean Ponds of standing VWater. For upon both them, the Sun hath more power than upon Fountains, or small Rivers. And I conceive that Chalk-VWater is next them the best, for going furthest in Drink. For that also helpeth Concoction; so it be out of a Deep VWell; for then it Cureth the

the Rawnesse of the *Water*; But *Chalkie Water* towards the top of the Earth, is too fretting; as it appeareth in Laundry of Clothes, which wear out apace, if you use such *Waters*.

Fifthly, the Housewives do finde a Difference in *Waters*, for the Bearing or Not bearing of Soap: and it is likely that the more Fat *Water* will bear Soap best; For the Hungry *Water* doth kill the Unctuous Nature of the Soap.

Sixthly, you may make a Judgement of *Waters*, according to the Place, whence they spring or come: The Rain-*Water* is by the Physicians esteemed the finest and the best; But yet it is said to putrisie soonest; which is likely, because of the finest of the Spirit; and in Conservatories of Rain water, (such as they have in Venice, &c.) they are found not so choise *Waters*; (the worse perhaps) because they are Covered aloft, and kept from the Sun. *Snow-water* is held unwholesome; Inasmuch as the People, that dwell at the Foot of the *Snow Mountaines*, or otherwise upon the Ascent, (especially the Women) by drinking of *snow water*, have great Bags hanging under their Throats. Well water, except it be upon Chalk, or a very plentiful spring maketh Meat Red, which is an ill sign; Springs on the tops of High Hills are the best: For both they seem to have a Lightnesse, and Appetite of Mounting; and besides they are most pure and unmingled: And again are more Percolated through a great space of Earth. For *Waters* in Valleys, joyn in effect under Ground with all *Waters* of the same Levell; Whereas Springs on the Tops of Hills, passe through a great deal of Pure Earth with less Mixture of other *Waters*.

Seventhly, Judgement may be made of *Waters* by the Soyle whereupon the Water runneth; as Pebble is the cleanest and best tasted; and next to that Clay *Water*; and Thirdly *Water* upon Chalk; Fourthly that upon Sand; And worst of all upon Mudd. Neither may you trust *Waters* that Taste sweet; For they are commonly found in Rising Grounds of great Cities, which must needs take in a great deal of Filth.

IN Peru and divers Parts of the West Indies, though under the Line, the Heats are not so intolerable, as they be in Barbary and the skirts of the Torrid Zone. The Causes are, First the great Brizes, which the Motion of the Air in great Circles (such as are under the Girdle of the World) produceth, which do refrigerate; and therefore in those Parts Noon is nothing so hot, when the Brizes are great, as about nine or ten of the Clock in the Fore-Noon. Another Cause is, for that the Length of the Night and the Dews thereof do compence the Heat of the Day. A third Cause is the stay of the Sun: Not in respect of Day and Night (for that we spake of before,) but in respect of the Season; For under the Line, the Sun crosseth the Line, and maketh two summers and two Winters; But in the skirts of the Torrid Zone, it doubleth and goeth back again, and so maketh one Long Summer.

THE Heat of the Sun maketh Men Black in some Countries, as in Ethiopia and Ginny, &c. Fire doth it not as we see in Glasse-Men, that are continually about the Fire. The Reason may be, because Fire doth lick up the Spirits, and Bloud of the Body, so as they exhale; so that it ever maketh Men look Pale and Sallow; but the Sun which is a gentler Heat, doth but draw the Blood to the Outward Parts, And rather Concocteth it, than Soaketh it: And therefore we see that all Ethiopes are Fleshly, Plump, and have great Lips; all which betoken Moisture retained, and not

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Experiment
Solitary, touching the
Temperate Heat
under the Equinoctial.

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Experiment
Solitary, touching the Coloration of Black
and Tawny Moors.

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drawn out. We see also that the *Negroes* are bred in Countries that have plenty of *Water*, by *Rivers*, or otherwise: For *Meroë*, which was the *Metropolis* of *Æthiopia*, was upon a great *Lake*; and *Congo*, where the *Negroes* are, is full of *Rivers*. And the confines of the *River Niger*, where the *Negroes* also are; are well watered: and the Region about *Capo Verde*, is likewise moist, in so much as it is pestilent through moisture: But the Countries of the *Abyssenes*, and *Barbary*, and *Pernu*, where they are *Tawney*, and *Olivafter*, and *Pale*, are generally more sandy and dry. As for the *Æthiopes*, as they are *Plump* and *Fleahly*; so (it may be) they are *Sanguine*, and *ruddy colour'd*, if their black skin would suffer it to be seen.

Experiment
Solitary, touch-
ing Motion
after the In-
stant of Death.
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SOME *Creatures* do move a good while after their Head is off, As *Birds* Some a very little time, as *Men* and all *Beasts*. Some move, though cut in severall pieces, as *Snakes*, *Eeles*, *Worms*, *Flies*, &c. First therefore it is certain, that the *Immediate cause* of *Death*, is the *Resolution* or *Extinguishment* of the *Spirits*; and that the *Destruction* or *Corruption* of the *Organs*, is but the *Mediate cause*. But some *Organs* are so peremptorily necessary, that the *Extinguishment* of the *Spirits* doth speedily follow; But yet so as there is an *interime* of a small *Time*. It is reported by one of the *Ancients*, of credit, that a *Sacrificed Beast* hath lowed after the heart hath been severed; And it is a Report also of credit, that the Head of a *Pig* hath been opened, and the *Braine* put into the *Palme* of a mans hand, trembling, without breaking any part of it, or severing it from the *Marrow* of the *Back-bone*; During which time the *Pig* hath been, in all appearance, stark dead, and without motion; And after a small time the *Brain* hath been replaced; and the *Skull* of the *Pig* closed, and the *Pig* hath a little after gone about. And certain it is, that an *Eie* upon *Revenge* hath been thrust forth, so as it hang'd a pretty distance by the *Visual Nerve*; And during that time the *Eye* hath been without any *Power* of *Sight*; and yet after (being replaced) recovered *Sight*. Now the *Spirits* are chiefly in the *Head*, and *Cells* of the *Brain* which in *Men* and *Beasts* are *Large*; and therefore, when the *Head* is off, they move little or nothing. But *Birds* have small *Heads*, and therefore the *Spirits* are a little more dispersed in the *Sinews*, whereby *Motion* remaineth in them a little longer; in so much as it is Extant in *Story*, that an *Emperour* of *Room*, to shew the *Certainty* of his hand, did shoot a great *Forked Arrow* at an *Estrich*, as she ran swiftly upon the *stage*, and stroke off her *Head*, and yet she continued the *Race*, a little way, with the *Head* off. As for *Wormes*, and *Flies*, and *Eales*, the *Spirits* are diffused almost all over; And therefore they move in their severall Pieces.

NATURAL



NATURAL HISTORY.

V. Century.



WE will now enquire of *Plants or Vegetables*: And we shall do it with dilligence. They are the principall part of the *Third dayes work*. They are the first *Producatur*, which is the Word of *Animation*; For the other Words are but the Words of *Essence*; And they are of excellent and generall Use, for Food, Medicine, and a Number of Mechanicall Arts.

Experiments
in Confort
touching the
Acceleration of
Germination.

There were sown in a *Bed*, *Turnip-Seed*, *Raddish-Seed*, *Wheat*, *Cucumber-Seed* and *Pease*. The *Bed* we call a *Hot-Bed*, and the Manner of it is this. There was taken *Horse-dung*, old, and well rotted; This was laid upon a Bank, half a foot high, and supported round about with Planks; and upon the Top was cast Sifted Earth, some two Fingers deep; and then the seed sprinkled upon it, having been steeped all night in *Water* mixed with *Cow-dung*. The *Turnip-Seed*, and the *Wheat*, came up half an Inch above ground, within two days after, without any Watering: The rest the third day. The Experiment was made in *October*; and (it may be in the *Spring*, the *Accelerating* would have been the speedier. This is a Noble Experiment; for, without this help, they would have been four times as long in coming up. But there doth not occur to me, at this present, any use thereof, for profit; except it should be for Sowing of *Pease*, which have their price very much increased, by the early coming. It may be tried also with *Cherries*, *Strawberries*, and other Fruit, which are dearest, when they come early.

There was *Wheat*, steeped in *Water* mixed with *Cow-dung*; Others in *Water* mixed with *Horse-dung*; Other in *Water* mixed with *Pigeon-dung*; Other in *Urine of Man*; Other in *Water* mixed with *Chalk Powder*; Other in *Water* mixed with *Soot*; Other in *Water* mixed with *Ashes*; Other in *Wa-*

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ter mixed with *Bay-Salt*; Other in *Claret Wine*; Other in *Malmsey*; Other in *Spirit of Wine*. The proportion of the mixture was, a fourth Part of the Ingredients to the *Water*; save that there was not of the *Salt* above an eighth Part. The *Urine*, and *Winds*, and *Spirit of Wine*, were simple without mixture of *Water*. The Time of Steeping was twelve hours. The Time of the Year *October*. There was also other *Wheat* sown *unsteeped*, but watered twice a day with *warm Water*. There was also other *Wheat* sown *simple* to compare it with the rest. The event was, that those that were in the Mixture of *Dung*, and *Urine*, *Soot*, *Chalk*, *Ashes*, and *Salt*, came up within six days: And those, that afterwards proved the Highest, Thickest, and most Lusty, were, first the *Urine*, and then the *Dungs*; next the *Chalk*, next the *Soot*, next the *Ashes*, next the *Salt*, next the *Wheat simple* of it self *unsteeped* and *unwatered*, next the *watered twice a day* with warm water, next the *Claret Wine*. So that these three last were slower than the Ordinary *Wheat* of it self; and this Culture did rather retard than advance. As for those that were steeped in *Malmsey*, and *Spirit of Wine*, they came not up at all. This is a Rich Experiment for Profit; For the most of the steepings are Cheap Things; and the goodnesse of the Crop is a great Matter of Gain; If the goodnesse of the Crop answer the Earliness of the Coming up, as it is like it will; Both being from the Vigour of the Seeds; which also partly appeared in the former Experiment, as hath been said. This Experiment would be tried in other Grains, Seed, and Kernells; For it may be some steeping will agree best with some Seeds. It would be tried also with *Roots* steeped as before, but for longer time. It would be tried also in *Severall Seasons* of the Year, especially in the Spring.

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Strawberries watered now and then (as once in three days,) with *Water*, wherein hath been steeped *Sheeps-dung*, or *Pigeons-dung*, will prevent and come early. And it is like the same Effect would follow in other *Betties*, *Herbs*, *Flowers*, *Grains*, or *Trees*. And therefore it is an Experiment, though vulgar in *Strawberries*, yet not brought into use generally: For it is usuall to help the Ground with *Muck*; and likewise to Recomfort it sometimes with *Muck* put to the *Roots*; But to water it with *Muck-water*, which is like to be more Forcible, is not practised.

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Dung, or *Chalk*, or *Blood*, applied in Substance, (seasonably,) to the *Roots* of *Trees*, doth set them forwards. But to do it unto *Herbs*, without Mixture of *Water* or *Earth*, it may be these helps are too hot.

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The former Means of helping Germination, are either by the Goodnesse and Strength of the Nourishment, or by the Comforting and Exciting the Spirits in the Plant, to draw the Nourishment better. And of this latter kind, concerning the Comforting of the Spirits of the Plant, are also the experiments that follow; Though they be not Applications to the *Root*, or *Seed*. The Planting of *Trees* warm upon a *Vvall*, against the South, or South-East Sun, doth hasten their Coming on and Ripening; and the South-East is found to be better than the South-West, though the South-West be the Hotter Coast. But the cause is chiefly, for that the Heat of the Morning succeedeth the Cold of the Night: and partly, because, (many times) the South-West Sun is too parching. So likewise Planting of them upon the Back of a *Chimney* where a *Fire* is kept, doth hasten their Coming on, and Ripening: Nay more, the Drawing of the *Boughs* into the Inside of a *Room*, where a *Fire* is continually kept, worketh the same Effect; which hath been tried with *Grapes*; Inſomuch as they will come a Moneth earlier, then the *Grapes* abroad.

Besides

Besides the two *Meanes* of *Accelerating Germination*, formerly described; That is to say, the *Attending* of the *Nourishment*, *Conforting* of the *Spirit* of the *Plant*; there is a *Third*, which is the *Making Way* for the *Easie Coming* to the *Nourishment*, and *Drawing* it. And therefore *Gentle Digging* and *Loosening* of the *Earth* about the *Roots* of *Trees*, and the *Removing Herbs* and *Flowers* into new *Earth*, once in two years, (which is the same thing, For the new *Earth* is ever looser,) doth greatly further the *Prospering*, and *Earliness* of *Plantes*.

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But the most admirable *Acceleration*, by *Facilitating* the *Nourishment*, is that of *Water*. For a *Standard* of a *Damask Rose* with the *Root* on, was set in a *Chamber*, where no *Fire* was, upright in a *Earthen Pan*, full of *Fair Water*, without any *Mixture*, half a foot under the *Water*, the *Standard* being more than two Foot high above the *Water*: Within, in the *Space* of ten days, the *Standard* did put forth a fair *Green leaf*, and some other little *Buds*, which stood at a *stay*, without any *shew* of decay or *withering*, more then seven days. But afterwards that *Leaf* faded, but the young *Buds* did sprout on; which afterward opened into fair *Leaves*, in the *space* of three *Moneths*; and continued so a while after, till upon *Removall* we left the *Triall*. But note that the *Leaves* were somewhat paler, and lighter-coloured, then the *Leaves* use to be abroad. Note that the first *Buds* were in the end of *October*; and it is likely that if it had been in the *Spring* time, it would have put forth with greater strength, and (it may) be to have grown on to bear *Flowers*. By this *Meanes*, you may have, (as it seemeth) *Roses* set in the midst of a *Pool*, being supported with some *stay*; Which is *Matter* of *Rareness* and *Pleasure*; though of small *Use*. This is the more strange for that the like *Rose Standard* was put, at the same time, into *Water* mixed with *Horse-dung*, the *Horse-dung* about the fourth Part to the *Water*, and in four *Moneths* space (while it was observed) put not forth any *Leaf*, though divers *Ends* at the first, as the other.

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A *Dutch Flower*, that had a *Bulbous Root*, was likewise put, at the same time, all under *Water*, some two or three *Fingers* deep; and within seven days sprouted, and continued long after, further *Growing*. There were also put in, a *Beet-Root*, a *Borrage-Root*, and a *Raddish-Root*, which had all their *Leaves* cut almost close to the *Roots*; and within six weeks had fair *Leaves*; and so continued, till the end of *November*.

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Note that if *Roots*, or *Pease*, or *Flowers* may be *Accelerated* in their *Coming* and *Ripening*, there is a double *Profit*; The one in the high *Price* that those *Things* bear when they come early: The other in the *Swiftness* of their *Returns*: For in some *Grounds* which are strong, you shall have a *Raddish*, &c. come in a *Moneth*; that in other *Grounds* will not come in two; and so make double *Returns*.

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Wheat also was put into the *Water*, and came not forth at all; so as it seemeth there must be some strength and Bulk in the *Body*, put into the *Water*, as it is in *Roots*; for *Graines*, or *Seeds*, the Cold of the *Water* will mortifie. But casually some *Wheat* lay under the *Pan*, which was somewhat moistened by the *Suing* of the *Pan*; which in six weeks (as aforesaid) looked mouldy to the *Eye*, but it was sprouted forth half a *Fingers* length.

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It seemeth by these *Instances* of *Water*, that for *Nourishment*, the *Water* is almost all in all, and that the *Earth* doth but keep the *Plant* upright, and save it from *Over-heat*, and *Over-cold*; and therefore is a comfortable *Experiment* for good *Drinkers*. It proveth also that our former *Opinion*: That

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Drink

Drink incorporate with Flesh, or Roots, (as in Capon-Beer, &c.) will nourish more easily, than Meat and Drink taken severally.

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The *Housing of Plants* (I conceive) will both *Accelerate Germination*, and bring forth *Flowers and Plants* in the *Colder Seasons*: And as we *Houfe Hot Country Plants*, as *Lemons, Oranges, Myrtils*, to save them; so we may *Houfe* our own *Country Plants*, to forward them, and make them come in the cold seasons; In such sort, that you may have *Violets, Strawberries, Pease*, all Winter: So that you sow, or remove them at fit times. This Experiment is to be referred unto the *Comforting of the Spirit of the Plant*, by *Warmth*, as well as *Housing their Boughs, &c.* So then the *Means*, to *Accelerate Germination*, are in Particular eight, in General three.

Experiments
in Comfort
touching the
Putting back
or Retardation
of Germination.

413

TO make *Roses* or other *Flowers* come late, it is an Experiment of Pleasure. For the Ancients esteemed much of *Rosa Sera*. And indeed the *November-Rose* is the sweetest, having been less exhiled by the Sun. The Means are these: First, the *Cutting off their Tops*; immediately after they have done Bearing; and then they will come again the same year about *November*: But they will not come just on the *Tops*, where they were cut, but out of those *Shoots* which were (as it were,) *Water-Boughs*. The Cause is, for that the *Sap*, which otherwise would have fed the *Top*, (though after Bearing,) will, by the discharge of that, divert unto the *Side-Sprouts*; and they will come to bear, but later.

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The Second is the *Pulling off the Buds of the Rose*, when they are *Newly Knotted*; For then the *Side Branches* will bear. The Cause is the same with the former: For *Cutting off the Tops*, and *Pulling off the Buds*, work the same Effect, in Retention of the *Sap* for a time, and Diversion of it to the *Sprouts*, that were not so forward.

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The Third is the *Cutting off some few of the Top-boughs* in the *Spring-time*, but suffering the lower *Boughs* to grow on. The Cause is, for that the *Boughs* do help to draw up the *Sap* more strongly: And we see that in *Powling of Trees*, many do use to leave a *Bough* or two on the *Top* to help to draw up the *Sap*. And it is reported also, that if you graft upon the *Bough of a Tree*, and cut off some of the old *Boughs*, the new *Cions* will perish.

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The Fourth is by *Laying the Roots bare about Christmas* some days. The Cause is plain, for that it doth arrest the *Sap*, from going upwards, for a time; Which Arrest, is afterwards released by the *Covering of the Root* again with *Earth*; and then the *Sap* getteth up, but later.

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The Fifth is the *Removing of the Tree* some Moneth before it *Buddeth*. The Cause is, for that some time will be required after the *Remove*, for the *Resetling*, before it can draw the *Juyce*; and that time being lost, the *Blossom* must needs come forth later.

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The sixth is the *Grafting of Roses in May*, which commonly *Gardeners* do not till *July*; and then they bear not till the *Next Year*; But if you graft them in *May*, they will bear the same year, but late.

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The seventh is the *Girding of the Body of the Tree* about with some *Packthread*; For that also in a degree, restraineth the *Sap*, and maketh it come up more late, and more slowly.

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The Eighth is the *Planting of them in a Shade*, or in a *Hedge*. The Cause is, partly the *Keeping out of the Sun*, which hastneth the *Sap* to rise; and partly the *Robbing of them of Nourishment*, by the *stuff* in the *Hedge*; these means may be practised upon other, both *Trees*, and *Flowers*, *Mutatis Mutandis*.

Men

Men have entertained a Conceit that sheweth prettily; Namely, that if you graft a *Late-coming-Fruit*, upon a Stock of a *Fruit-Tree* that cometh early, the Graft will bear *Fruit early*; As a Peach upon a Cherry, and contrariwise if an *Early-coming-Fruit* upon a Stock of a *Fruit-Tree* that cometh late the Graft will bear *Fruit late*; as a Cherry upon a Peach, But these are but Imaginations, and untrue. The Cause is, for that the Cions over-ruleth the Stock quite; and the Stock is but Passive only, and giveth Aliment, but no Motion to the Graft.

We will speak now, how to make *Fruits*, *Flowers*, and *Roots* larger, in more plenty and sweeter than they use to be; and how to make the *Trees* themselves more tall, more Spread, and more Hasty and Sudden, than they use to be Wherein there is no doubt, but the former *Experiments of Acceleration* will serve much to these purposes. And again that these *Experiments*, which we shall now set down, do serve also for *Acceleration*; because both Effects proceeds from the Encrease of vigour in the Tree; but yet to avoid Confusion. And because some of the Meanes are more proper for the one effect and some for the other, we will handle them apart.

Experiments
in Confore
touching the
Melioration of
Fruit, Trees,
and Plants.

It is an assured Experience. that an *Heap of Flint or Stone*, laid about the Bottom of a *Wilde Tree*, (as in Oak, Elm, Ash, &c.) upon the first Planting, doth make it prosper double as much as without it. The Cause is, for that it retaineth the Moisture, which falleth at any time upon the Tree, and suffereth it not to be exhaled by the Sun. Again it keepeth the Tree warme from Cold Blasts and Frosts as it were in an house. It may be also there is somewhat in the keeping of it steady at the first. *Quare*, if Laying of straw some height about the Body of a Tree, will not make the Tree forwards. For though the Root giveth the Sap, yet it is the Body that draweth it. But you must note, that if you lay *Stones* about the Stalk of Lettuce, or other Plants, that are more Soft, it will over-Moisten the Roots, so as the Worms will eat them.

A Tree at the first *Setting*, should not be shaken, untill it hath taken Root fully: And therefore some have put to little Forks about the Bottom of their Trees, to keep them upright; But after a years Rooting, then Shaking doth the Tree good, by loosening of the Earth, and (perhaps) by Exercising (as it were) and stirring the Sap of the Tree.

Generally, the *Cutting away of Boughs*, and *Suckers* at the Root and Body, doth make Trees grow high; and contrariwise, the *Poling* and *Cutting* of the Top, maketh them grow spread and Bushy. As we see in *Pollards*, &c.

It is reported that to make *hasty growing Coppice-wood*, the way is, to take *Willow*, *Sallow*, *Poplar*, *Alder*, of some seven years growth; and to set them, not upright, but a slope, a reasonable depth under the Ground; and then in stead of one Root they will put forth many, and so carry more shoots upon a Stem.

When you would have many new Roots of *Fruit-Trees*, take a *Low Tree*, and bow it, and lay all his Branches a-flat upon the ground; and cast Earth upon them; and every Twig will take Root. And this is very profitable

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ble Experiment for costly Trees; (for the Boughs will make stocks without charge,) such as are *Apricots, Peaches, Almonds, Cornelians, Mulberries, Figs, &c.* The like is continually practised with *Vines, Roses, Muske-Roses, &c.*

427 From *May* to *July* you may take off the *Bark* of any *Bough*, being of the Bignesse of three or four Inches, and cover the bare place, somewhat above and below, with *Loame* well tempered with horse dung, binding it fast down. Then cut off the bough about *Alhollantide* in the bare Place, and set it in Ground; and it will grow to be a fair Tree in one Year. The Cause may be, for that the Bearing from the *Bark* keepeth the *Sap* from descending towards Winter, and so holdeth it in the Bough; and it may be also that *Loam* and *Horse-dung* applyed to the bare place, do moisten it, and cherish it; and make it more apt to put forth the Root. Note, that this may be a generall Meanes for keeping up the *Sap* of Trees in their boughs which may serve to other Effects.

428 It hath been practised in Trees, that shew fair and bear not, to Bore a Hole thorow the Heart of the Tree, and thereupon it will bear. Which may be, for that the Tree before hath too much Repletion, and was oppressed with his own Sap; For Repletion is an Enemy to Generation.

429 It hath been practised in Trees, that do not bear, to cleave two or three of the chief Roots, and to put into the Cleft a small Pebble, which may keep it open, and then it will bear. The Cause may be, for that a Root of a Tree may be (as it were) Hide-bound, no lesse then the Body of the Tree; but it will not keep open without somewhat put into it.

430 It is usually practised, to set Trees that require much Sun, upon walls against the South. As *Apricots, Peaches, Plums, Vines, Figs*, and the like. It hath a double commodity; the one, the Heat of the Wall by Reflexion; The other, the taking away of the Shade; For when a Tree groweth round, the upper boughs over shaddow the lower, but when it is spread upon a Wall, the Sun cometh alike, upon the upper, and lower Branches.

431 It hath also been practised (by some) to pull some Leaves from the Trees so spread, that the Sun may come upon the Bough and Fruit the better. There hath been practised also a Curiosity, to set a Tree upon the North side of a Wall, and at a little hieght, to draw him through the Wall, and spread him upon the South side: conceiving that the Root and lower Part of the Stock should enjoy the Freshnesse of the shade; and the Upper Boughs and Fruit, the Comfort of the Sun. But it sorted not; The Cause is, for that the Root requireth some comfort from the Sun, though under Earth; as well as the Bodie; and the lower part of the Body more than the Upper as we see in compassing a Tree below with straw.

432 The Lownesse of the Bough, where the Fruit cometh, maketh the Fruit greater and to ripen better; for you shall ever see in *Apricotes, Peaches*, or *Melo-Cotones*, upon a Wall, the greatest Fruits towards the Bottome, And in France the *Grapes* that make the Wine, grow upon the low Vines, bound to small stakes. And the raised Vines in Arbours make but Verjuyce. It is true that in Italy and other Countries, where they have hotter Sun, they raise them upon *Elmes* and Trees; But I conceive, that if the French manner of Planting low, were brought in use, their Vines would be stronger and sweeter. But it is more chargeable in respect of the Props. It were good to try whether a Tree grafted somewhat near the ground, and the lower boughs only maintained, and the higher continually pruned off, would not make a larger Fruit.

To have *Fruit* in *Greater Plenty*, the way is, to graft, not onely upon young *Stocks*, but upon divers *Boughes* of an old *Trees*; for they will bear great *Numbers* of *Fruit*; whereas if you graft but upon one *Stock*, the *Tree* can bear but few.

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The *Digging* yearly about the *Roots* of *Trees*, which is a great meanes, both to the *Acceleration* and *Melioration* of *Fruits*, is practised in nothing but in *Vines*; which if it were transferred unto other *Trees*, and *Shrubs*, (as *Roses*, &c.) I conceive, would advance them likewise.

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It hath been known, that a *Fruit-Tree* hath been blown up (almost) by the *Roots*, and set up again, and the next year bare exceedingly. The *Cause* of this, was nothing but the *Loosening* of the *Earth*, which comforteth any *Tree*, and is fit to be practised, more than it is, in *Fruit-Trees*: For *Trees* cannot be so fitly removed into *New Grounds*, as *Flowers* and *Herbs* may.

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To revive an *Old Tree*, the *Digging* of it about the *Roots*, and Applying new Mould to the *Roots*, is the Way. We see also that *Draught-Oxen*, put into fresh *Pasture*, gather new and tender *Flesh*; and in all *Things*, better *Nourishment* than hath been used, doth help to renew; especially, if it be not only better, but changed, and differing from the former.

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If an *Herb* be cut off from the *Roots*, in the beginning of *Winter*, and then the *Earth* be trodden and beaten down hard, with the *Foot* and *Spade*, the *Roots* will become of very great *Magnitude* in *Summer*. The *Reason* is, for that the *Moisture* being forbidden to come up in the *Plant*, stayeth longer in the *Root*, and so dilateth it. And *Gardiners* use to tread down any loose *Ground* after they have sown *Onions*, or *Turnips*, &c.

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If *Panicum* be laid below, and about the *Bottom* of a *Root*, it will cause the *Root* to grow to an *Excessive Bigness*. The *Cause* is, for that being it self of a *Spungy Substance*, it draweth the *Moisture* of the *Earth* to it, and so feedeth the *Root*. This is of greatest use for *Onions*, *Turnips*, *Parsnips*, and *Carrets*.

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The *loosening* of *Ground* is a *Meanes* to better the *Tree*, and *Fruit*; but with this *Cautions*; That all things do prosper best, when they are advanced to the better: Your *Nursery* of *Stocks* ought to be in a more *Barren Ground*, than the *Ground* is whereunto you remove them. So all *Craftsmen* preferre their *Cattell* from meaner *Pastures* to better. We see also, that *Hardness* in *Youth* Lengthneth *Life*, because it *Leaveth* a *Cherishing* to the better, of the *Body*, in *Age*: Nay in *Exercises* it is good to begin with the hardest, as *Dancing* in *Thick Shooes*, &c.

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It hath been observed, that *Hacking* of *Trees* in their *Barke*, both downright, and a crosse, so as you make them rather in *Slices*, than in continued *Hacks*, doth great good to *Trees*, and especially delivereth them from being *Hide-Bound*, and killeth their *Moss*.

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Shade to some *Plants* conduceth to make them large and prosperous, more than *Sun*; as in *Strawberries*, and *Bays*, &c. Therefore amongst *Strawberries*, sow here and there some *Borage-Seed*; and you shall find the *Strawberries* under those *Leaves* far more large than their *Fellows*. And *Bays* you must plant to the *North*; or defend them from the *Sun* by a *Hedge-Row*; and when you sow the *Berries*, weed not the *Borders*, for the first half year; for the *Weed* giveth them *Shade*.

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To increase the *Crops* of *Plants*, there would be considered, not only the *Increasing* the *Lust* of the *Earth*, or of the *Plant*, but the *Saving* also of that which is spilt. So they have lately made a *Triall*, to set *Wheat*; which nevertheless

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vertheless hath been left off, because of the trouble and pains; Yet so much is true, that there is much saved by the *Setting*, in comparison of that which is *Sown*; Both by keeping it from being picked up by Birds; and by avoiding the Shallow lying of it, whereby much that is sown, taketh no Root.

443 It is prescribed by some of the *Ancients*, that you take *Small Trees*, upon which *Figs* or other *Fruit* grow, being yet unripe, and cover the *Trees* in the middle of *Autumn* with dung, untill the Spring; and then take them up in a warm day, and replant them in good Ground; and by that means, the former years *Tree* will be ripe, as by a new Birth, when other *Trees* of the same kind do but blossom. But this seemeth to have no great Probability.

444 It is reported, that if you take *Nitre*, and mingle it with *Water*, to the thickness of *Honey*, and therewith annoint the *Bud*, after the *Vine* is cut, it will sprout forth within eight dayes. The Cause is like to be, (if the *Experiment* be true) the opening of the *Bud*, and of the parts, contiguous, by the Spirit of the *Nitre*; For *Nitre* is (as it were) the Life of *Vegetables*.

445 Take *Seed*, or *Kernells* of *Apples*, *Pears*, *Orenges*, Or a *Peach*; or a *Plum-Stone*, &c. And put them into a *Squill*, (which is like a great *Onion*) and they will come up much earlier than in the *Earth* it self. This I conceive to be as a kind of *Grafting* in the *Root*; For as the Stock of a *Graft* yieldeth better prepared Nourishment to the *Graft*, than the Crude *Earth*; So the *Squill* doth the like to the *Seed*; and, I suppose, the same would be done, by Putting *Kernells* into a *Turnip*, or the like; Save that the *Squill* is more Vigorous, and Hot. It may be tried also, with putting *Onion-Seed* into an *Onion-Head*, which thereby (perhaps) will bring forth a larger, and earlier *Onion*.

446 The Pricking of a *Fruit* in severall places, when it is almost at his Bigness, and before it ripeneth, hath been practised with success, to ripen the *Fruit* more suddenly. We see the Example of the Biting of *Wasps* or *Worms*, upon *Fruit*, (whereby it manifestly) ripeneth the sooner.

447 It is reported, that *Alga Marina*, (*Sea-Weed*) put under the *Roots* of *Col-worts*, and (perhaps) of other *Plants*, will further their Growth. The virtue (no doubt) hath relation to *Salt*, which is a great help to Fertility.

448 It hath been practised, to cut off the *Stalks* of *Cucumbers*, immediately after their *Bearing*, close by the *Earth*; and then to cast a pretty Quantity of *Earth* upon the *Plant* that remaineth, and they will bear the next year *Fruit*, long before the ordinary time. The Cause may be, for that the *Sap* goeth down the sooner, and is not spent in the *Stalk* or *Leaf*; which remaineth after the *Fruit*. Where note, that the *Dying*, in the winter, of the *Roots* of *Plants*, that are *Annuall*, seemeth to be partly caused by the Over-Expende of the *Sap* into *Stalk*, and *Leaves*; which being prevented, they will super-annuate, if they stand warm.

449 The Pulling off many of the *Blossoms* from a *Fruit-Tree*, doth make the *Fruit* fairer. The Cause is manifest; For that the *Sap* hath the less to nourish. And it is a Common Experience, that if you do not pull off some *Blossoms*, the first time a *Tree* bloometh, it will blossom it self to death.

450 It were good to try, what would be the Effect, if all the *Blossoms* were pulled from a *Fruit-Tree*; Or the *Acorns*, and *Chestnut-Buds*, &c. from a *Wild Tree*, for two years together. I suppose that the *Tree* will either put forth, the third year, bigger, and more plentiful *Fruit*; Or else, the same year, larger *Leaves*, because of the *Sap* stored up.

It hath been generally received, that a *Plant Watred* with *Warm Water*, will come up sooner and better, than with *Cold Water*, or with *Showers*. But our *Experiment of Watering Wheat with Warm Water* (as hath been said) succeeded not; which may be, because the *Trial* was too late in the Year viz. in the end of *October*, For the *Cold* then coming upon the *Seed*, after it was made more tender by the *Warm Water*, might check it.

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There is no doubt, but that *Grafting* (for the most Part) doth *Meliorate*, the *Fruit*. The *Cause* is manifest; for that the nourishment is better prepared in the *Stock*, than in the *Crude Earth*. But yet note well, that there be some *Trees*, that are said to come up more happily from the *Kernell*, than from the *Graft*; as the *Peach*, and *Melocotone*. The *Cause* I suppose to be, for that those *Plants* require a Nourishment of great Moisture; and though the Nourishment of the *Stock* be finer, and better prepared, yet it is not so moist, and plentiful, as the Nourishment of the *Earth*. And indeed we see those *Fruits* are very *Cold Fruits* in their Nature.

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It hath been received, that a *Smaller Pear*, grafted upon a *Stock* that beareth a *Greater Pear*, will become great. But I think it is as true, as that of the *Prime-Fruit upon the Late Stock*; and *Controverso*; which we rejected before: For the *Cions* will govern. Nevertheless it is probable enough; that if you can get a *Cions* to grow upon a *Stock* of another kind, that is much moister than his own *Stock*, it may make the *Fruit* greater; because it will yield more plentiful Nourishment, though it is like it will make the *Fruit* baser. But generally the *Grafting* is upon a drier *Stock*; as the *Apple* upon a *Crab*; the *Pear* upon a *Thorne*, &c. Yet it is reported, that in the *Low-Countries* they will graft an *Apple-Cions* upon the *Stock* of a *Colewort*, and it will bear a great flaggy *Apple*; the *Kernell* of which, if it be set, will be a *Colewort*, and not an *Apple*. It were good to try, whether an *Apple-Cions* will prosper, if it be grafted upon a *Sallow*, or upon a *Poplar*, or upon an *Alder*, or upon an *Elm*, or upon an *Horse-Plum*, which are the moistest of *Trees*. I have heard that it hath been tried upon an *Elm*, and succeeded.

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It is manifest by Experience, that *Flowers* Removed wax greater, because the Nourishment is more easily come by, in the loose *Earth*. It may be, that oft *Regrafting* of the same *Cions*, may likewise make *Fruit* greater; as if you take a *Cions*, and graft it upon a *Stock* the first year; and then cut it off, and graft it upon another *Stock* the second year; and so for a third; or fourth year; and then let it rest, it will yield afterward, when it beareth, the greater *Fruit*.

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Of *Grafting* there are many Experiments worth the Noting, but those we reserve to a Proper Place.

It maketh *Figs* better, if a *Fig-Tree*, when it beginneth to put forth *Leaves*, have his *Top* cut off. The *Cause* is plain, for that the *Sap* hath the less to feed, and the less way to mount: But it may be the *Fig* will come somewhat later, as was formerly touched. The same may be tried likewise in other *Trees*.

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It is reported, that *Mulberries* will be fairer, and the *Tree* more fruitfull, if you bore the *Trunk* of the *Tree* thorow, in several places, and thrust into the Places bored, *Wedges* of some hot *Trees*, as *Turpentine*, *Mastick-Tree*, *Guaiacum*, *Juniper*, &c. The *Cause* may be, for that *Adventive Heat* doth cheer up the *Native Juyce* of the *Tree*.

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It is reported, that *Trees* will grow greater, and bear better *Fruit*, if you put *Salt*, or *Lees of Wine*, or *Blood* to the *Root*. The *Cause* may be the En-

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creasing the Lust or Spirit of the *Root*; These things being more forcible, than ordinary *Composts*.

458 It is reported by one of the Ancients, that *Artichoakes* will be less prickly, and more tender, if the *Seeds* have their Tops dulled, or grated off upon a Stone.

459 *Herbs* will be tenderer, and fairer, if you take them out of *Beds*, when they are newly come up, and remove them into *Pots*, with better *Earth*. The Remove from *Bed* to *Bed* was spoken of before; but that was in several years; this is upon the sudden. The *Cause* is the same with other *Removes*, formerly mentioned.

460 *Coleworts* are reported by one of the Ancients, to prosper exceedingly, and to be better tasted, if they be sometimes watered with *Salt-water*; and much more with water mixed with *Nitre*; the Spirit of which is less Adu-
rent than *Salt*.

461 It is reported, that *Cucumbers* will prove more tender and dainty, if their *Seeds* be steeped (little) in *Milk*; the *Cause* may be, for that the *Seed* being mollified with the *Milk*, will be too weak to draw the grosser Juicy of the *Earth*, but only the finer. The same *Experiment* may be made in *Artichoaks*; and other *Seeds*; when you would take away, either their *Flashiness*, or *Bitterness*. They speak also, that the like Effect followeth, of *Steeping* in *Water* mixed with *Honey*; but that seemeth to me not so probable, because *Honey* hath too quick a Spirit.

462 It is reported, that *Cucumbers* will be less Watry, and more Melon-like, if in the Pit where you set them, you fill it (half way up) with *Chaff*, or small *Sticks*, and then power *Earth* upon them; For *Cucumbers*, as it seemeth, do extremely affect Moisture, and over-drink themselves; Which this *Chaff*, or *Chips* forbiddeth. Nay it is further reported, that if when a *Cucumber* is grown, you set a Pot of water about five or six Inches distance from it, it will, in 24. hours, shoot so much out, as to touch the Pot: which if it be true, it is an *Experiment* of an higher Nature, than belongeth to this Title: For it discovereth *Perception* in *Plants*, to move towards that which should help and comfort them, though it be at a distance. The ancient Tradition of the *Vine* is far more strange: It is, that if you set a Stake, or Prop, some distance from it, it will grow that way; which is far stranger (as is said) than the other: For that *Water* may work by a *Sympathy* of *Attraction*: But this of the *Stake* seemeth to be a Reasonable Discourse.

363 It hath been touched before, that *Terebration* of *Trees* doth make them prosper better. But it is found also, that it maketh the *Fruit* sweeter, and better. The *Cause* is, for that, notwithstanding the *Terebration*, they may receive Aliment sufficient; and yet no more than then can well turn, and digest; and withall do sweat out the courtest and unprofitablest Juicy; even as it is in *Living Creatures*; which, by Moderate feeding, and Exercise, and Sweat, attain the soundest habit of Body.

464 As *Terebration* doth *Meliorate Fruit*, so, upon the like reason, doth *Letting* of *Plants Blood*; as *Pricking Vines*, or other *Trees*, after they be of some Growth, and thereby letting forth *Gumme*, or *Tears*; though this be not to continue, as it is in *Terebration*, but at some Seasons. And it is reported, that by this Artifice, *Bitter Almonds* have been turned into *Sweet*.

465 The Ancients for the *Dulcorating* of *Fruit*, do commend *Swines-dung* above all other *Dung*, which may be, because of the Moisture of that Beast, whereby the *Excrement* hath less Acrimony, for we see *Swines* and *Pigs* *Flesh* is the Moistest of *Fleshes*.

It is observed by some, that all *Herbs* wax sweeter, both in smell and Taste, if after they be grown up some reasonable time, they be cut, and so you take the latter sprout. The Cause may be, for that the longer the Juycce stayeth in the Root and Stalk, the better it concocteth. For one of the chief Causes, why *Graines*, *Seeds*, and *Fruits*, are more Nourishing than *Leaves*, is the length of time, in which they grow to *Maturation*. It were not amisse to keep back the Sap of *Herbs*, or the like, By some fit meanes, till the end of Summer; whereby (it may be) they will be more nourishing.

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As *Grafting* doth generally advance and *Meliorate Fruits*, above that which they would be if they where set of *Kernels* or *Stones*, in regard the *Nourishment* is better concocted, So (no doubt) even in *Grafting*, for the same cause the Choice of the *Stock* doth much; Alwayes provided, that it be somewhat inferiour to the *Cions*. For otherwise it dulleth it. They commend much the *Grafting* of *Pears*, or *Apples*, upon a *Quince*.

467

Besides the *Meanes* of *Melioration* of *Fruits*, before mentioned, it is set down as tried, that a *Mixture* of *Bran* and *Swines-Dung*, or *Chaffe* and *Swines-Dung* (especially laid up together for a month to rot) is a very great Nourisher and Comforter to a *Fruit-Tree*.

468

It is delivered, that *Onions* wax greater, if they be taken out of the Earth, and laid a drying twenty dayes, and then set again; and yet more, if the outermost *Pill* be taken off all over.

469

It is delivered by some that if one take the *Bough* of a *Low-Fruit-Tree*, newly budded and draw it gently, without hurting it, into an *Earthen* pot perforate at the bottom to let in the *Plant*, and then cover the *Pot* with *Earth*, it will yield a very large *Fruit* within the *Ground*. Which *Experiment* is nothing but *potting* of *Plants*; without removing & leaving the *Fruit* in the *Earth*. The like (they say) will be effected by an empty *Pot* without *Earth* in it put over a *Fruit*, being propped up with a *Stake*, as it hangeth upon the *Tree*; & the better if some few *Pertusions* be made in the *Pot*. Wherein, besides the defending of the *Fruit*, from extreameity of *Sun* or *Weather*, some give a reason that the *Fruit*, loving and coveting the open *Air* and *Sun*, is invited by the *Pertusions*, to spread and approach, as near the open *Air* as it can; and so inlargeth in *Magnitude*.

470

All *Trees*, in *High* and *Sandy Grounds*, are to be set deep; And in *Watry Grounds* more shallow. And in all *Trees*, when they be removed (especially *Fruit-Trees*) care ought to be taken, that the sides of the *Trees* be coasted, (*North* and *South* &c.) as they stood before. The same it said also of *Stone* out of the *Quarry*, to make it more durable; Though that seemeth to have lesse reason; Because the *Stone* lyeth not so near the *Sun*, as the *Tree* groweth.

471

Timber Trees in a *Coppice-wood*, do grow better, than in an *Open Field*; Both because, they offer not to spread so much, but shoot up still in height, and chiefly because they are defended from too much *Sun* and *Wind*, which do check the Growth of all *Fruit*; And so (no doubt) *Fruit-Trees*, or *Vines*, set upon a *Wall*, against the *Sun* between *Elbowes* and *Buttrisses* of *Stone*, ripen more, than upon a plain *Wall*.

472

It is said that if *Potado Roots*, be set in a *Pot* filled with *Earth*, and then the *Pot* with *Earth* be set likewise within the *Ground*, some two or three *Inches*, the *Rootes* will go greater than Ordinary. The Cause may be, for that having *Earth* enough within the *Pot* to nourish them; and then being stopped by the *Bottome* of the *Pot* from putting *Strings* downward, they must needs grow greater in *Breadth*, and *Thicknesse*. And it may be

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that all *Seeds Roots, potted*, and so set into the *Earth*, will prosper the better.

474

The *Cutting off* the *Leaves of Radish*, or other *Roots*, in the beginning of Winter before they wither; and *Covering* again the *Root*, something high with *Earth*, will preserve the *Root* all Winter and make it bigger, in the Spring following as hath been partly touched before. So that there is a double use of this *Cutting off* the *leaves*: For in *Plants*, where the *Root* is the *Esculent*, as *Radish*, and *Parsnips*, it will make the *Root* the greater; and so it will do to the *Heads of Onions*, and where the *Fruit* is the *Esculent*, by strengthening the *Root*, it will make the *Fruit* also the greater.

475

It is an *Experiment* of great pleasure, to make the *Leaves of Shaddy Trees*, larger than ordinary. It hath been tried (for certain) that a *Cions* of a *Vveech Elme*, grafted upon the stock of an ordinary *Elme*, will put forth *Leaves*, almost as broad as the brim of ones hat. And it is very likely, that as in *Fruit-Trees*, the *Graft* maketh a greater *Fruit*; so in *Trees* that bear no *Fruit*, it will make the greater *Leaves*. It would be tryed therefore in *Trees* of that kinde chiefly; As *Birch*, *Ash*, *Willow*; And especially the *Shining Willow*, which they call *Swallow-Taile*, because of the pleasure of the Leaf.

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The *Barrenesse of Trees by Accident*, (besides, the *Weaknesse* of the *Soil Seed* or *Root*, and the *Injury* of the *Weather*) coming either of their *Overgrowing* with *Moss*; or their being *Hide bound*; or their *Planting* too deep; or by *Issuing* of the *Sap* too much into the *Leaves*: For all these three are *Remedies* mentioned before,

Experiments
in Confort
touching Com-
pound Fruits
and Flowers.

We see that in *Living Creatures*, that have *Male* and *Female*, there is *Copulation* of severall kinds and so *Compound Creatures*: As the *Mule*, that is generated betwixt the *Horse* and *Ass*; and some other *Compounds*, which we call *Monsters*, though more rare; & it is held, that that *Proverb*, *Africa semper aliquid Monstri parit*, cometh, for that the *Fountains of Waters* there being rare, divers *Sorts* of *Beasts* come from severall parts to drink; & so being refreshed, fall to couple, and many times with severall kinds. The *Compounding* or *Mixture of Kinds* in *Plants* is not found out; which nevertheless, if it be possible is more at command than that of *Living Creatures*; For that their *Lust* requireth a voluntary *Motion*; wherefore it were one of the most *Notable Experiments* touching *Plants*. to find it out for so you may have great variety of *New-Fruits*, and *Flowers* yet unknown. *Grafting* doth it not; That mendeth the *Fruit* or doubleth the *Flowers*, &c. But it hath not the *Power* to make a *New Kind*. For the *Cions* ever over-ruleth the *Stock*.

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It hath been set down by one of the *Ancient*, that if you take two *Twigs* of severall *Fruit Trees*, and flat them on the *Sides*, and then binde them close together, and set them in the ground, they will come up in one *Stock*; But yet they will put forth in their severall *Fruits* without any *Commixture* in the *Fruit*. Wherein note (by the way) that *Unity of Continuance* is easier to procure

procure, than *Unity of Species*. It is reported also that *Vines of Red and White Grapes*, being set in the ground, and the upper parts being flatted, and bound close together, will put forth *Grapes* of the several Colours, upon the same Branch; and *Grape-Stones* of several Colours within the same *Grape*: But the more, after a year or two, the *Unity* (as it seemeth) growing more Perfect. And this will likewise help, if from the first *Uniting*, they be often watred; For all Moisture helpeth to *Union*. And it is prescribed also, to binde the *Bud*, as soon as it cometh forth, as well as the *Stock*; at the least for a time.

They report, that divers *Seeds* put into a *Clont*, and laid in Earth well dugged, will put up *Plants Contiguous*; which (afterwards) being bound in, their *Shoots* will *Incorporate*. The like is said of *Kernels* put into a *Bottle* with a narrow Mouth, filled with Earth.

It is reported, that young *Trees* of several kindes, set contiguous without any binding, and very often watred, in a *Fruitfull Ground*, with the very luxury of the *Trees*, will incorporate, and grow together. Which seemeth to me the likeliest Meanes, that hath been propounded; for that the *Binding* doth hinder the Natural Swelling of the *Tree*, which, while it is in Motion, doth better *Unite*.

There are many Ancient and Received Traditions and Observations, touching the *Sympathy* and *Antipathy* of *Plants*; For that some will thrive best growing near others; which they impute to *Sympathy*: And some worse; which they impute to *Antipathy*. But these are Idle and Ignorant Conceits; and forsake the true *Indication* of the *Causes*; as the most part of *Experiments*, that concern *Sympathies* and *Antipathies* do. For as to *Plants*, neither is there any such secret *Friendship*, or *Hatred*, as they imagine. And if we should be content to call it *Sympathy* and *Antipathy*, it is utterly mistaken; for their *Sympathy* is an *Antipathy*, and their *Antipathy* is a *Sympathy*: For it is thus, wherefoever one *Plant* draweth such a particular *Juyce* out of the Earth, as it qualifieth the Earth, so as that *Juyce* which remaineth is fit for the other *Plant*, there the Neighbourhood doth good; because the Nourishments are contrary, or several: But where two *Plants* draw (much) the same *Juyce*, there the Neighbourhood hurteth; for the one deceiveth the other.

First, therefore, all *Plants* that do draw much *Nourishment* from the Earth and so soak the Earth, and exhaust it, hurt all things that grow by them; As great *Trees*, (especially *Ashes*) and such *Trees*, as spread their *Roots*, near the Top of the Ground. So the *Colewort* is not an Enemy (though that were anciently received) to the *Vine* onely; But it is an Enemy to any other *Plant*; Because it draweth strongly the fattest *Juyce* of the Earth. And if it be true, that the *Vine*, when it creepeth near the *Colewort*, will turn away; This may be, because there it findeth worse Nourishment; For though the *Root* be where it was, yet (I doubt) the *Plant* will bend as it nourisheth.

Experiments
in Confort
renching the
Sympathy and
Antipathy of
Plants.

- 481 Where *Plants* are of severall Natures, and draw severall Juyces out of the Earth, there (as hath been said) the one set by the other helpeth: As it is set down by divers of the Ancients, that *Rew* doth prosper much, and becometh stronger, if it be set by a *Fig-Tree*: Which (we conceive) is caused not by reason of *Friendship*, but by *Extraction* of contrary Juyces: The one drawing *Juyce* fit to result sweet, the other Bitter. So they have set down likewise, that a *Rose* set by *Garlick* is sweeter: which likewise may be, because the more Fetide Juyce of the Earth goeth into the *Garlick*, and the more Odate into the *Rose*.
- 482 This we see manifestly, that there be certain *Corn-Flowers*, which come seldome or never in other places unlesse they be set, but onely amongst *Corn*: As the *Blew* bottle a kinde of *Yellow Mary-gold*, *Wilde Poppey*, and *Fumitory*. Neither can this be by reason of the Culture of the Ground, by Plowing or Furrowing, as some *Herbs* and *Flowers* will grow but in *Ditches* new cast, for if the ground ly fallow and unsown, they will not come: So as it should seem to be the *Corn* that qualifieth the Earth, and prepareth it for their Growth.
- 483 This Observation if it holdeth (as it is very probable) is of great use, for the *Meliorating* of Taste in *Fruits*, and *Esculent Herbs*, and of the *Sent* of *Flowers*. For I do not doubt, but if the *Fig-Tree* do make the *Rew* more strong and bitter, (as the Ancients have noted) good store of *Rew* planted about the *Fig-Tree*, will make the *Fig* more sweet. Now the *Tastes* that do most offend in *Fruits*, and *Herbs*, and *Roots*, are Bitter, Harsh, Sowre, and Watrish, or Flasy. It were good therefore to make the *Tryals* following.
- 484 Take *Wormwood* or *Rew*, and set it near *Lettuce*, or *Coleflory*, or *Artichoke*; And see whether the *Lettuce*, or the *Coleflorie*, &c. become not the sweeter.
- 485 Take a *Service-Tree*, or a *Cornelian Tree*, or an *Elder Tree*, which we know have *Fruits* of harsh and binding Juice, and set them near a *Vine* or *Fig-tree*, and see whether the *Grapes* or *Figs* will not be the sweeter.
- 486 Take *Cucumbers*, or *Pumpions*, and set them (here and there) amongst *Musk-Melons*, and see whether the *Melons* will not be more winy, and better tasted. Set *Cucumbers* (likewise) amongst *Radish*, and see whether the *Radish*, will not be made the more Biting.
- 487 Take *Sorrel* and set it amongst *Rasps*, and see whether the *Rasps* will not be the sweeter.
- 488 Take common *Briar* and set it amongst *Violets*, or *Wall Flowers*, and see whether it will not make the *Violets*, or *Wall Flowers* sweeter, and less earthy in their smell. So set *Lettuce* or *Cucumbers*, amongst *Rosemary* or *Bays* and see whether the *Rosemary* or *Bays*, will not be the more Odate or Aromaticall.
- 489 Contrariwise, you must take heed how you set *Herbs* together, that draw much the like Juyce. And therefore I think *Rosemary* will leese in sweetness if it be set with *Lavender*, or *Bays*, or the like. But yet, if you will correct the strength of an herb, you shall do well to set other like herbs by him, to take him down; and if you would set *Tansy* by *Angelica*, it may be the *Angelica* would be the weaker and fitter for Mixture in Perfume. And if you should set *Rew* by *Common-wormwood*, it may be, the *Wormwood* would turn to be liker *Roman Wormwood*.
- 490 This *Axiom* is of large extent; And therefore would be severed, and refined by *Triall*. Neither must you expect to have a *Gross* difference by this kind of Culture, but onely *Further Perfection*.

Triall would be also made in *Herbs Paysonous*, and *Purgative*, whose ill Quality (perhaps) may be discharged, or attempted, by Setting stronger *Poysons*, or *Purgatives*, by them.

It is reported, that the *Shrub* called *Our Ladies Seale*, (which is a kinde of *Briony*,) and *Coleworts*, set near together, one or both will die. The Cause is, for that they be both great Depredatours of the Earth, and one of them starveth the other. The like is said of *Reed* and a *Brake*; both which are succulent; and therefore the one deceiveth the other. And the like of *Hemlock* and *Rew*; both which draw strong Juices.

Some of the Ancients, and likewise divers of the Modern Writers, that have laboured in *Natural Magick*, have noted a *Sympathy*, between the *Sun*, *Moon*, and some Principall Stars; and certain *Herbs*, and *Plants*. And so they have denominated some *Herbs Solar*, and some *Lunar*; and such like Toys put into great Words. It is manifest that there are some *Flowers*, that have Respect to the *Sun* in two Kinds; The one by *Opening* and *Shutting*; and the other by *Earing* and *Inclining* the Head. For *Mary golds*, *Tu-lippas*, *Pimpernell*, and indeed most *Flowers*, do open or spread their Leaves abroad, when the *Sun* shineth serene and fair: And again, (in some part) close them, or gather them in ward, either toward Night, or when the Skie is overcast. Of this there needeth no such Solemn Reason to be assigned, as to say, that they rejoyce at the presence of the *Sun*; and mourne at the absence thereof. For it is nothing else, but a little loading of the Leaves, and Swelling them at the Bottome, with the Moisture of the Air; whereas the dry Air doth extend them: And they make it a Piece of the Wonder, that *Garden Claver* will hide the *Stalk*, when the *Sun* sheweth bright; which is nothing but a full Expansion of the Leaves. For the *Bowing* and *Inclining* the Head: It is found in the great *Flower* of the *Sun*; in *Mari-golds*, *Wart-wort*, *Mallow Flowers*, and others. The Cause is somewhat more obscure than the former: But I take it to be no other, but that the part, against which the *Sun* beateh, waxeth more faint and flaccide in the *Stalk*, and thereby less able to support the *Flower*.

What a little *Moisture* will do in *Vegatables*, even though they be dead, and severed from the earth, appeareth well in the Experiment of *Juglers*. They take the *Beard* of an *Oate*; which (if you mark it well) is wreathed at the Bottom, and one smooth entire *Straw* at the Top. They take only the Part that is Wreathed, and cut off the other, leaving the *Beard* half the Breadth of a finger in length. Then they make a little *Cross* of a *Quill* long ways, of that Part of the *Quill* which hath the *Pith*; and *Cross* ways of that Piece of the *Quill* without *Pith*: the whole *cross* being the Breadth of a Finger high. Then they prick the Bottome where the *Pith* is, and thereinto they put the *Oate beard*, leaving half of it sticking forth of the *Quill*: Then they take a little white Box of wood, to deceive Men, as if somewhat in the Box did work the Feat: In which with a Pinne, they make a little Hole, enough to take the *Beard*, but not to let the *Cross* sink down but to stick. Then likewise by way of Imposture, they make a question: As, who is the fairest Woman in the Company? Or Who hath a Glove, or Card? And cause another to name divers Persons: and upon every Naming, they stick the *Cross* in the Box, having first put it towards their Mouth, as if they charmed it, and the *Cross* stirreth not. But when they come to the Person that they would take; as then hold the *Cross* to their Mouth, they touch the *Beard* with the Tip of their Tongue, and wet it, and so stick the *Cross* in the Box, and then you shall see it turn finely and

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stet gaita
stet gaita
stet gaita
stet gaita

and softly, three or four Turnes; which is caused by the untwining of the *Beard* by the Moisture. You may see it more evidently, if you stick the *Cross* between your fingers, instead of the *Box*: And therefore you may see, that this Motion, which is Effected by so little Wet, is stronger than the Closing or Bending of the Head of a *Marigold*.

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It is reported by some, that the *Herb* called *Rosa-Solis*, (whereof they make Strong Waters) will at the Noon-day, when the *Sun* shineth hot and bright, have a great Dew upon it. And therefore, that the right Name is *Ros Solis*: which they impute to a Delight and *Sympathy* that it hath with the *Sun*. Men favour Wonders. It were good first to be sure, that the Dew that is found upon it, be not the Dew of the Morning Preserved, when the Dew of other *Herbs* is breathed away: For it hath a smooth and thick Leaf, that doth not discharge the Dew so soon as other *Herbs*, that are more Spungy and Porous. And it may be *Purflane*, or some other *Herb*, doth the like, and is not marked. But if it be so that it hath more Dew at Noon than in the Morning, then sure it seemeth to be an Exudation of the *Herb* it self. As *Plummes* sweat when they are set into the Oven: For you will not (I hope) think, that it is like *Gideons Fleece* of *VVool*, that the Dew should fall upon that, and no where else.

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It is certain, that the *Hony-dews* are found more upon *Oake leaves*, than upon *Ash*, or *Beech*, or the like: But whether any Cause be from the Leaf it self, to concoct the Dew: Or whether it be only, that the Leaf is close and smooth, (and therefore drinketh not in the Dew, but preserveth it) may be doubted. It would be well inquired, whether *Manna* the Drug, doth fall but upon certain *Herbs* or *Leaves* only. *Flowers*, that have deep *Sockets*, do gather in the bottom, a kind of *Honey*; as *Honey-Suckles*, (both the *VVoodbine*, and the *Trifoile*,) *Lillies*, and the like. And in them certainly the Flower beareth part with the Dew.

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The Experience is, that the *Froth*, which they call *VVoodfare*, (being like a kinde of Spittle) is found but upon certain *Herbs*, and those hot ones; as *Lavender*, *Lavender-cotton*, *Sage*, *Hyssope*, &c. Of the Cause of this enquire further, for it seemeth a secret. There falleth also *Mildew* upon *Corn*, and smutteth it: But it may be, that the same falleth also upon other *Herbs*, and is not observed.

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It were good, Triall were made, whether the great Consent between *Plants* and *Water*, which is a principall Nourishment of them, will make an *Attraction* or Distance, and not at Touch only. Therefore take a *Vessel*, and in the Middle of it make a false Bottom of course Canvass: Fill it with Earth above the Canvass, and let not the Earth be watred: Then sow some good *Seeds* in that Earth: But under the Canvass, some half a foot in the Bottom of the *Vessel*, lay a great *Sponge*, thorowly wet in *Water*; and let it ly some ten Days; And see whether the *Seeds* will sprout, and the Earth become more Moist, and the *Sponge* more dry. The Experiment formerly mentioned of the *Cucumber*, creeping to the Pot of *Water*, is far stranger than this.

Experiments
in Consort
touching the
Making Herbs
and Fruits
Mediciable.

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THE Altering of the Sent, Colour, or Taste of *Fruit*, by Infusing, Mixing, or Letting into the Bark, or Root of the Tree, *Herb*, or *Flower*, any Coloured, Aromaticall, or Medicinall Substance, are but Fancies. The Cause is, for that those things have passed their Period, and nourish not: and all Alteration of Vegetables, in those Qualities, must be by somewhat that is apt to go into the Nourishment of the *Plant*. But this is true, that where *Kine* feed upon

Wilde

Wilde Garlick, their *Milk* tasted plainly of the *Garlick*: And the *Flesh* of *Muttons* is better tasted where the *Sheep* feed upon *Wilde Thyme*, and other wholesome *Herbs*. *Galen* also speaketh of the curing of the *Scirr* of the *Liver*, by *Milk* of a *Cow*, that feedeth upon certain *Herbs*; and *Honey* in *Spain* smelleth (apparently) of the *Rosemary*, or *Orange*, from whence the *Bee* gathereth it: And there is an old Tradition of a *Maiden* that was fed with *Napellus*; (which is counted the strongest poyson of all *Vegetables*) which with use did not hurt the *Maid*, but poysoned some that had Carnal Company with her. So it is observed by some, that there is a vertuous *Bezoar*, and another without vertue; which appear to the shew alike; but the Vertuous is taken from the *Beast*, that feedeth upon the *Mountains*, where there are *Theriaceall Herbs*; and that without Vertue, from those that fed in the *Valleys*, where no such *Herbs* are. Thus far I am of Opinion; that as Steeped *Wines* and *Beers* are very *Medicinall*; and likewise *Bread* tempered with divers *Powders*; so of *Meat* also, (as *Flesh*, *Fish*, *Milk*, and *Egs*) that they may be made of great use for *Medicine* and *Diet*, if the *Beast*, *Fowl*, or *Fish*, be fed with a speciall kind of food, fit for the *Disease*. It were a dangerous thing also for secret Emppoysonments. But whether it may be applied unto *Plants*, and *Herbs*, I doubt more; because the Nourishment of them is a more common *Juyce*; which is hardly capable of any speciall Quality untill the *Plant* do assimilate it.

But lest our *Incredulity* may prejudice any profitable Operations in this kind (especially since many of the *Ancients* have set them down) we think good briefly to propound the four *Means*, which they have devised of making *Plants Medicinable*. The first is by *Slitting* of the *Root*, and *Infusing* into it the *Medicine*; as *Hellebore*, *Opium*, *Scammomy*, *Triacle*, &c. And then binding it up again. This seemeth to me the least probable, because the *Root* draweth immediately from the *Earth*; and so the nourishment is the more Common, and less qualified: And besides it is a long time in going up, ere it come to the *Fruit*. The Second way is, to *Perforate* the *Body* of the *Tree*, and there to *Infuse* the *Medicine*; which is somewhat better: For if any vertue be received from the *Medicine*, it hath the less way, and the less time to go up. The Third is, the *Steeping* of the *Seed* or *Kernell* in some *Liquor*, wherein the *Medicine* is *Infused*; which I have little Opinion of, because the *Seed* (I doubt) will not draw the *Parts* of the *Matter*, which have the *Propriety*: But it will be far the more likely, if you mingle the *Medicine* with *Dung*; for that the *Seed*, naturally drawing the *Moisture* of the *Dung*, may call in withall some of the *Propriety*. The fourth is, the *Watering* of the *Plant* oft, with an *Infusion* of the *Medicine*. This, in one respect may have more force than the rest; because the *Medication* is oft renewed; whereas the rest are applied but at one time: And therefore the Vertue may the sooner vanish. But still I doubt, that the *Root* is somewhat too stubborn to receive those fine *Impressions*; and besides, (as I have said before) they have a great *Hill* to go up. I judge therefore the likeliest way to be the *Perforation* of the *Body* of the *Tree*, in severall places, one above the other; and the *Filling* of the *Holes* with *Dung* mingled with the *Medicine*. And the *Watering* of those *Lumps* of *Dung*, with *Squirts* of an *Infusion* of the *Medicine* in *Dunged Water*, once in three or four *Dayes*.

500



NATURAL HISTORY.

V.I Century.



Our *Experiments* we take care to be, (as we have often said,) either *Experimenta Fructifera*, or *Lucifera*; Either of *Use*, or of *Discovery*; For we hate *Impostures*: And despise *Curiosities*. Yet because we must apply our selves somewhat to Others, we will set down some *Curiosities touching Plants*.

Experiments
in Confort
touching Cur-
iosities about
Fruits and
Plants.

It is a *Curiosity* to have *Several Fruits* upon *one Tree*; And the more, when some of them come *Early*, and some come *Late*; So that you may have, upon the same *Tree*, *Ripe Fruits* all Summer. This is easily done, by Grafting of severall *Cions*, upon severall *Boughs* of a *Stock*, in a good Ground, plentifully fed. So you may have all *Kinds of Cherries*, and all *Kinds of Plumbs*, and *Peaches*, and *Apricots* upon one *Tree*; But, I conceive the *Diversity* of *Fruits* must be such, as will graft upon the same *Stock*. And therefore, I doubt, whether you can have *Apples*, or *Pears*, or *Oranges*, upon the same *Stock*, upon which you graft *Plumbs*.

501

It is a *Curiosity* to have *Fruits* of *Divers Shapes*, and *Figurs*. This is easily performed by Moulding them, when the *Fruit* is young, with Moulds of Earth, or Wood. So you may have *Cucumbers*, &c. as Long as a *Cane*; Or as round as a *Sphere*; Or formed like a *Cross*. You may have also *Apples*, in the form of *Pears*, or *Limmons*. You may have also *Fruit* in more Accurate *Figures*; as we said of *Men*, *Beasts*, or *Birds*, according as you make the Moulds, wherein you must understand, that you make the Mould big enough, to contain the whole *Fruit*, when it is grown to the greatest: For else you will choak the Spreading of the *Fruit*; Which otherwise would spread it self, and fill the Concave, and so be turned into the *Shape* desired; as it is in Mould-works of Liquid things. Some doubt may be conceived,

502

ceived, that the Keeping of the Sun from the *Fruit*, may hurt it: But there is ordinary experience of *Fruit* that groweth covered. *Quere* also, whether some small Holes, may not be made in the Wood, to let in the Sun. And note, that it were best to make the Moulds partible, glued, or cemented together, that you may open them, when you take out the *Fruit*.

503 It is a *Curiosity*, to have *Inscriptions*, or *Engravings*, in *Fruit*, or *Trees*. This is easily performed, by *Writing* with a *Needle*, or *Bodkin*, or *Knife*, or the like, when the *Fruit*, or *Trees* are young; for as they grow, so the Letters will grow more large, and Graphical.

——— *Tenerisque meos incidere Amores
Arboribus, crescent illæ, crescetis Amores.*

504 You may have *Trees* apparelled with *Flowers*, or *Herbs*, by *Boring* Holes in the *Bodies* of them, and putting into them *Earth* holpen with *Muck*, and *Setting* *Seeds*, or *Slips*, of *Violets*, *Strawberries*, *Wild-Thyme*, *Camomill*, and such like in the *Earth*, wherein they do but grow, in the *Tree*, as they do in *Pots*; though (perhaps) with some feeding from the *Trees*. As it would be tried also with *Shoots* of *Vines*, and *Roots* of *Red-Roses*; For it may be, they being of a more *Ligneous* Nature, will incorporate with the *Tree* it self.

505 It is an ordinary *Curiosity*, to form *Trees* and *Shrubs*, (as *Rosemary*, *Juniper*, and the like) into *Sundry* *Shapes*; which is done by *Moulding* them within, and *Cutting* them without. But they are but lame things, being too small to keep *Figure*: Great *Castles* made of *Trees* upon *Frames* of *Timber*, with *Turrets*, and *Arches*, were *Anciently* matters of *Magnificence*.

506 Amongst *Curiosities*, I shall place *Colouration*, though it be somewhat better: For *Beauty* in *Flowers* is their *Preheminence*. It is observed by some, that *Gilly-Flowers*, *Sweet-Williams*, *Violets*, that are *Coloured*, if they be neglected, and neither *Watered*, nor *New Moulded*, nor *Transplanted*, will turn *White*. And it is probable, that the *White*, with much culture, may turn *Coloured*, for this is certain, that the *White* *Colour* cometh of *Scarcity* of *Nourishment*; Except in *Flowers* that are only *White*, and admit no other *Colours*.

507 It is good therefore, to see what *Natures* do accompany what *Colours*; For by that you shall have *Light*, how to induce *Colours*, by *Producing* those *Natures*. *Whites* are more *Inodorate*, (for the most part) than *Flowers* of the same kind *Coloured*; as is found in *Single white Violets*, *White-Roses*, *White Gilly-Flowers*, *White Stock-Gilly-Flowers*, &c. We find also that *Blossoms* of *Trees* that are *White*, are commonly *Inodorate*; as *Cherries*, *Pears*, *Plums*; Whereas those of *Apples*, *Crabs*, *Almonds*, and *Peaches*, are *Blushy*, and smell sweet. The *Cause* is, For that the *Substance* that maketh the *Flower*, is of the *thinnest* and *finest* of the *Plant*; Which also maketh *Flowers* to be of so dainty *Colours*. And if it be too sparing and thin, it attaineth no strength of *Odour*; Except it be in such *Plants*, as are very *Succulent*; Whereby they need rather to be scantied in their *Nourishment*, than replenished, to have them sweet. As we see in *White Satyrion*, which is of a *Dainty* *Smell*; And in *Bean-Flowers*, &c. And again, if the *Plant* be of *Nature*, to put forth *White* *Flowers* only, and those not thin, or drie, they are commonly of rank and fulsome *Smell*; As *May-Flowers*, and *White Lillies*.

508 Contrariwise, in *Berries*, the *White* is commonly more *Delicate*, and *Sweet* in *Taste*, than the *Coloured*; as we see in *White Grapes*; In *White Raspes*; In *White Strawberries*; In *White Currans*, &c. The *Cause* is, for that the

the Coloured are more juyced, and courser juyced; And therefore not so well and equally Concocted; but the *White* are better proportioned to the Digestion of the *Plant*.

But in *Fruits*, the *White* commonly is meaner, as in *Pear-Plums*, *Damofens*, &c. And the Choicest *Plummes* are Black; The *Mulberry*, (which though they call it a *Berry*, is a *Fruit*) is better the *Black*, than the *White*. The *Harvest White-Plumme*, is a base *Plumme*; and the *Verdoccio* and *White Date-Plumme*, are no very good *Plummes*. The Cause is, for that they are all Overwatry: Whereas an higher Concoction is required for Sweetness, or Pleasure of Taste; and therefore all your dainty *Plummes*, are a little drie, and come from the Stone; as the *Muskle-Plumme*, the *Damofin-Plumme*, the *Peach*, the *Apricot*, &c. Yet some *Fruits*, which grow not to be Black, are of the Nature of *Berries*, sweetest such as are paler, as the *Cœur-Cherry*, which inclineth more to *White*, is sweeter than the *Red*; but the *Egriot* is more sowre.

Take *Gilly-Flower-Seed*, of one kind of *Gilly-Flowers*, (As of the *Clove-Gilly-Flower* which is the most Common;) and sow it; and there will come up *Gilly-Flowers*, some of one Colour, and some of another, casually, as the *Seed* meeteth with Nourishment in the Earth: So that the *Gardiners* finde, that they may have two or three *Roots* amongst an hundred, that are rare, and of great Price, as *Purple*, *Carnation* of several *Stripes*; The Cause is, (no doubt) that in *Earth*, though it be contiguous, and in one Bed, there are very severall *Juyces*; and as the *Seed* doth casually meet with them, so it cometh forth. And it is noted especially, that those which do come up *Purple*, do alwayes come up Single; The *Juyce*, as it seemeth, not being able to suffice a *Succulent Colour*, and a *Double Lease*. This Experiment of severall Colours, coming up from one *Seed*, would be tried also in *Larkes-Foot*, *Monks-Hood*, *Poppy*, and *Hollioke*.

Few *Fruits* are coloured *Red* within; the *Queen-Apple* is; and another *Apple*, called the *Rose-Apple*, *Mulberries* likewise, and *Grapes*; though most toward the Skin. There is a *Peach* also, that hath a Circle of *Red* towards the Stone: And the *Egriot-Cherry* is somewhat *Red* within; but no *Pear*, nor *Warden*, nor *Plumme*, nor *Apricot*, although they have (many times) *Red* sides, are Coloured *Red* within. The Cause may be enquired.

The general Colour of *Plants* is *Green*, which is a Colour that no *Flower* is of. There is a *Greenish Prime-Rose*, but it is *Pale*, and scarce a *Green*; the *Leaves* of some *Trees* turn a little *Murry*, or *Reddish*; and they be commonly *Young Leaves* that do so; as it is in *Oakes*, and *Vines*. And *Hasse-Leaves* rot into a *Yellow*; and some *Hollies* had part of their *Leaves* *Tellow*, that are, (to all seeming) as *Fresh* and *Shining*, as the *Green*. I suppose also, that *Yellow* is a less *Succulent Colour*, than *Green*; and a degree nearer *White*. For it hath been noted, that those *Yellow Leaves* of *Holly*, stand ever toward the *North*, or *North-East*. Some *Roots* are *Yellow*, as *Carrets*; and some *Plants* *Blood-Red*, *Stalk* and *Leafe*, and all; as *Amaranthus*. some *Herbs* incline to *Purple* and *Red*; as a kinde of *Sage* doth, and a kinde of *Mint*, and *Rosa Solis*, &c. And some have *White Leaves*, as another kinde of *Sage*, and another kinde of *Mint*; But *Azure* and a *Fair Purple*, are never found in *Leaves*. This sheweth, that *Flowers* are made of a refined *Juyce* of the Earth; and so are *Fruits*: But *Leaves* of a more Course, and Common.

It is a *Curiosity* also to make *Flowers* *Double*; Which is effected by often Removing them into *New Earth*; as on the contrary part, *Double Flowers*,

by neglecting, and not Removing, prove *Single*. And the way to do it speedily, is to sow or set *Seeds*, or *Slips* of *Flowers*; and as soon as they come up, to remove them into new ground, that is good; enquire also, whether *Inoculating* of *Flowers*, (as *Stock-Gilly-Flowers*, *Roses*, *Musk-Roses*, &c.) doth not make them *Double*. There is a *Cherry-Tree*, that hath *Double Blossomes*; but that *Tree* beareth no *Fruit*: and, it may be, that the same Means, which applied to the *Tree*, doth extremely accelerate the *Sap* to rise, and break forth; Would make the *Tree* spend it self in *Flowers*, and those to become *Double*; Which were a great pleasure to see; Especially in *Apple-Trees*, *Peach-Trees*, and *Almond-Trees*, that have *Blossomes* *Blush* Coloured.

514 The *Taking* of *Fruits* without *Core* or *Stone*, is likewise a *Curiosity*, and somewhat better: Because whatsoever maketh them so, is like to make them more *Tender*, and *Delicate*. If a *Cions* or *Shoot*, fit to be set in the *Ground*, have the *Pith* finely taken forth; (and not altogether, but some of it left, the better to save the life) it will bear a *Fruit* with little, or no *Core* or *Stone*. And the like is said to be, of dividing a *Quick-Tree* down to the *Ground*, and taking out the *Pith*, and then binding it up again.

515 It is reported also, that a *Citron* grafted upon a *Quince*, will have small or no *Seeds*; and it is very probable, that any *Sowre-Fruit* grafted upon a *Stock*, that beareth a *Sweeter Fruit*, may both make the *Fruit*, sweeter, and more void of the harsh matter of *Kernels*, or *Seeds*.

516 It is reported, that not only the *Taking out* of the *Pith*, but the *Stopping* of the *Juice* of the *Pith*, from rising in the *Middest*, and *Turning* it to rise on the *Outside*, will make the *Fruit* without *Core* or *Stone*; as if you should bore a *Tree* clean thorow, and put a wedge in. It is true, there is some *Affinity* between the *Pith* and the *Kernell*, because they are both of a harsh Substance, and both placed in the *Middest*.

517 It is reported, that *Trees* *Watered* perpetually with *Warm Water*, will make a *Fruit*, with little or no *Core* or *Stone*. And the Rule is general, that whatsoever will make a *Wild-Tree*, a *Garden-Tree*, will make a *Garden-Tree* to have less *Core* or *Stone*.

518
Experiments
in Confort
touching the
Degenerating
of Plants; and
of the Trans-
mutation of
them, one
into another.

The Rule is certain, that *Plants* for want of *Culture*, degenerate to be baser in the same kind; and sometimes so far, as to change into another kind. 1. The *Standing long*, and not being *Removed*, maketh them degenerate. 2. *Drought*, unless the *Earth* of it self be moist, doth the like. 3. So doth *Removing into worse Earth*, or *Forbearing to compost the Earth*; as we see that *Water-Mint*, turneth into *Field Mint*; and the *Colewort* into *Rape* by Neglect, &c.

519

Whatsoever *Fruit* useth to be set upon a *Root*, or a *Slip*, if it be sown, will degenerate; *Grapes* sown, *Figs*, *Almonds*, *Pomgranate Kernels*, sown, make the *Fruits* degenerate, and become *Wilde*. And again, Most of those *Fruits*, that use to be *Grafted*, if they be set of *Kernels*, or *Stones*, degenerate. It is true, that *Peaches*, (as hath been touched before) do better upon *Stones* Set, than upon *Grafting*: And the Rule of Exception should seem to be this; That whatsoever *Plant* requireth much *Moisture*, prospereth better upon the *Stone*, or *Kernell*, than upon the *Graft*. For the *Stock*, though it giveth a finer *Nourishment*, yet it giveth a scantier, than the *Earth* at large.

520

Seeds, if they be very *Old*, and yet have strength enough to bring forth a *Plant*, make the *Plant* degenerate. And therefore skilful *Gardeners* make trial of the *Seeds*, before they buy them, whether they be good or no, by putting them

them in Water gently boyled ; and if they be good they will sprout with-
in halfe an hour.

It is strange which is reported, that *Basil* too much exposed to the Sun
doth turn into *Wilde Time* : Although those two *Herbs* seem to have small
Affinity ; but *Basil* is almost the onely hot *Herbe*, that hath Fat and Succu-
lent *Leaves* ; which *Oil* if it be drawn forth by the Sunne, it is like it
will make a very great change.

521

There is an Old Tradition, that *Boughs of Oake*, put into the Earth will
put forth *Wilde Vines* : which if it be true, (no doubt) it is not the *Oake* that
turneth into a *Vine*, but the *Oak bough* putrifying, qualifieth the Earth, to
put forth a *Vine* of it self.

522

It is not impossible and I have heard it verified, that upon *Cutting down* of
an old *Timber-Tree*, the *Stub* hath put out sometimes a *Tree* of another kind ;
as that *Beech* hath put forth *Birch* ; Which if it be true, the *Cause* may be
for that the old *Stub* is too scant of *Juyce* to put forth the former *Tree* ;
and therefore putteth forth a *Tree* of smaller kind, that needeth lesse *Nou-
rishment*.

523

There is an Opinion in the Country, that if the same *Ground* be oft sown,
with the *Grain* that grew upon it, it will, in the end, grow to be of a baser
kinde.

524

It is certain, that in *Sterile Tears*, *Corn* sown will grow to an *Other Kinde*.

525

*Grandia saepe quibus mandavimus Hordea Sulcis,
Infelix Lolium, & steriles dominatur Avena.*

And generally it is a Rule, that *Plants* that are brought forth by *Culture*, as
Corne, will sooner change into other *Species*, than those that come of them-
selves: For that *Culture* giveth but an *Adventitious Nature*, which is more
easily put off.

This worke of the *Transmutation of Plants*, one into another,
is *inter-Magnalia Naturæ* : For the *Transmutation of Species* is, in
the vulgar Philosophy, pronounced impossible : And certainly
it is a thing of difficulty, and requireth deep search into Na-
ture : But seeing there appear some manifest *Instances* of it, the
Opinion of impossibility is to be rejected ; and the meanes
thereof to be found out. We see that in *Living Creatures*, that
come of *Putrefaction*, there is much *Transmutation*, of one into
another. As *Caterpillers* turne into *Flies*, &c. And it should
seem probable, that whatsoever *Creature*, having life, is gene-
rated without *Seed*, that *Creature* will change out of one *Species*
into another. for it is the *Seed*, and the Nature of it which
locketh and boundeth in the *Creature*, that it doth not expatiate.
So as we may well conclude, that seeing the Earth, of it selfe,
doth put forth *Plants*, without *Seed*, therefore *Plants* may
well have a *Transmigration of Species*. Wherefore wanting *In-
stances*, which do occurre, we shall give *Directions* of the most
likely *Tryalls* : And generally, we would not have those,

that read this Worke of *Silva Sylvarum*, account it strange, or thinke that it is an Over-Haste, that we have set down Particulars untried ; For contrariwise, in our own Estimation , we account such Particulars, more worthy, than those that are already tried and known , For these latter must be taken as you finde them ; but the other do level Point blank at the *Inventing of Causes, and Axiomes.*

526 First, therefore you must make account, that if you will have one *Plant* change into another, you must have the *Nourishment* over-rule the *Seed*: and therefore you are to practise it by *Nourishments* as contrary as may be, to the *Nature* of the *Herb* ; so nevertheless as the *Herb* may grow, and likewise with *Seeds* that are of the weakest Sort, and have least vigour. You shall do well therefore, to take *Marsh-Herbs*, and plant them upon *Tops of Hills* and *Champaignes*; and such *Plants* as require much *Moisture*, upon *sandy*, and very *dry* grounds. As for example, *Marsh-Mallows*, and *Sedge* upon *Hills*, *Cucumber* and *Lettuce Seeds*, and *Coleworts* upon a *Sandy Plot*: so contrarywise plant *Bushes*, *Heath*, *Ling*, and *Brakes* upon a *Wet* or *Marsh Ground*. This I conceive also, that all *Esculent* and *Garden Herbs*, set upon the *Tops of Hills*, will prove more *Medicinal*, though lesse *Esculent*, than they were before. And it may be likewise, some *Wilde Herbs* you may make *Salut Herbs*. This is the first Rule for *Transmutation of Plants*.

527 The second Rule should be to bury some few *Seeds*, of the *Herb* you would change amongst other *Seeds* ; And then you shall see whether the *Juyce* of those other *Seeds* do not so qualifie the *Earth*, as it will alter the *Seed* whereupon you work As for Example; Put *Parsley-seed* amongst *Onion-seed* ; or *Lettuce-seed* amongst *Parsley-seed* ; or *Basil-seed* amongst *Thyme seed* ; and see the Change of *Taste* or otherwise. But you shall do well to put the *seed* you would change, into a little linnen Cloth, that it mingle not with the forrain *Seed*.

528 The third Rule shall be the making of some *Medly*, or *Mixture* of *Earth*, with some other *Plants* bruised, or shaved, either in *Leaf* or *Root* : As for Example make *Earth*, with a *Mixture* of *Colewort Leaves* stamped, and set in it *Artichoakes*, or *Parsnips* ; So take *Earth* made with *Majoram*, or *Origanum*, or *Wilde Thyme*, bruised, or stamped, and set in it *Fennel-seed*, &c. In which Operation, the *Proces* of *Nature* still will be, (as I conceive,) not that the *Herbe* you worke upon, should draw the *Juyce* of the *Forrain Herbe* ; (For that opinion we have formerly rejected;) But there will be a *New Confection* of *Mould*, which perhaps will alter the *Seed*, and yet not to the kinde of the former *Herb*.

529 The fourth Rule shall be, to mark what *Herbs*, some *Earths* do put forth of themselves ; And to take that *Earth*, and to *Port*, or to *Vessell* it ; And into that set the *Seed* you would change : As for Example, take from under *Walls*, or the like, where *Netles* put forth in abundance, the *Earth* which you shall there find, without any *String*, or *Root* of the *Nettles* ; And *Pot* that *Earth*, and set in it *Stock-Gilly-flowers*, or *VWall-Flowers*, &c. Or sow in the *Seeds* of them ; and see what the event will be : Or take *Earth*, that you have prepared to put forth *Mushroomes*, of it selfe, (whereof you shall finde some *Instances* following ;) And sow it in *Purslane-seed*, or *Lettuce-seed*, for in these *Experiments*, it is likely enough, that the *Earth* being accustomed to send forth one *Kinde* of *Nourishment*, will alter the new *Seed*.

The fifth Rule shall be, to make the *Herb* grow contrary to his Nature; as to make *Ground-Herbs* rise in Height: As for Example; Carry *Camomile*, or *Wild-Thyme*, or the *Green-Strawberry*, upon Sticks, as you do *Hops* upon Poles; and see what the Event will be.

530

The sixth Rule shall be to make *Plants* grow out of the *Sun*, or *Open Air*; For that is a great Mutation in Nature; And may induce a Change in the *Seed*: As barrell up *Earth*, and sow some *Seed* in it, and put in the Bottom of a Pond; Or put it in some great hollow *Tree*; Trie also the sowing of *Seeds* in the Bottomes of Caves; and Pots with *Seeds* sown, hanged up in Wells, some distance from the Water, and see what the event will be.

531

IT is certain, that *Timber-Trees* in *Coppice-Woods*, grow more upright, and more free from Under Boughs, than those that stand in the *Fields*: The Cause whereof is, for that *Plants* have a Naturall Motion, to get to the Sun; and besides, they are not glutted with too much Nourishment; for that the *Coppice* shareth with them; and Repletion ever hindreth Stature; Lastly, they are kept warm; and that ever in *Plants* helpeth Mounting.

Experiments in Consort touching the Procerity, and Lowness, and Artificiall dwarfing of Trees.

Trees that are, of themselves, full of Heat, (which Heat appeareth by their *Inflammable Gums*) as *Firres*, and *Pines*, mount of themselves in Height without Side-Boughs, till they come towards the top. The Cause is partly Heat, and partly Tenuity of Juyce; both which send the Sap upwards. As for *Juniper*, it is but a *Shrub*, and groweth not bigge enough in Body, to maintain a *Tall Tree*.

532

533

It is reported, that a good strong *Canvas*, spread over a *Tree* grafted low, soon after it putteth forth, will dwarfse it, and make it spread. The Cause is plain; for that all things, that grow, will grow as they find Room.

534

Trees are generally set of *Roots*, or *Kernells*; but if you set them of *Slips*, (as of some *Trees* you may, by name the *Mulberry*) some of the *Slips* will take; and those that take, (as is reported) will be *Dwarf-Trees*. The Cause is, for that a *Slip* draweth Nourishment more weakly, than either a *Root*, or *Kernell*.

535

All *Plants* that put forth their Sap hastily, have their Bodies not proportionable to their Length; and therefore they are *Winders* and *Creepers*; as *Ivy*, *Briony*, *Hops*, *Woodbine*: Whereas *Dwarfing* requireth a slow Putting forth, and less Vigour of Mounting.

536

The Scripture saith, that *Solomon* wrote a *Naturall History*: from the *Cedar of Libanus*, to the *Moss* growing upon the *Wall*: For so the best *Translations* have it. And it is true that *Moss* is but the Rudiment of a *Plant*; and (as it were) the Mould of *Earth*, or *Bark*.

Experiments in Consort touching the Rudiments of Plants, and of the Excrecences of Plants, or Super-Plants.

Moss groweth chiefly upon *Ridges* of *Houses*, tiled or thatched; and upon the *Crests* of *Walls*. and that *Moss* is of a light some and pleasant Green. The growing upon *Slopes* is caused, for that *Moss*, as on the one side it cometh of Moisture and Water, so on the other side the Water must but slide, and not stand or Poole. And the Growing upon *Tiles*, or *Walls*, &c. is caused, for that those dried *Earths*, having not Moisture sufficient to put forth a *Plant*, do practise *Germination* by Putting forth *Moss*: Though when by Age, or otherwise, they grow to relent and resolve, they

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sometimes

sometimes put forth *Plants*; as *Wall-Flowers*. And almost all *Moss* hath here and there little *Stalks*, besides the low *Thrum*.

538 *Moss* groweth upon *Alleyes*, especially such as lie Cold, and upon the North; as in divers *Tarrafes*: And again, if they be much trodden; Or if they were at the first gravelled; For wheresoever *Plants* are kept down, the Earth putteth forth *Moss*.

539 Old Ground, that hath been long unbroken up, gathereth *Moss*: And therefore Husbandmen use to cure their *Pasture-Grounds*, when they grow to *Moss*, by Tilling them for a year, or two: Which also dependeth upon the same Cause; For that the more Sparing and Starving Juyce of the Earth, insufficient for *Plants*, doth breed *Moss*.

540 Old Trees are more Mossy, (far) than Young; For that the Sap is not so frank as to rise all to the Boughes, but tyreth by the Way, and putteth out *Moss*.

Fountains have *Moss* growing upon the Ground about them;

Muscoli Fontes;

541 The Cause is, for that the Fountains drain the Water from the Ground Adjacent, and leave but sufficient Moisture to breed *Moss*: And besides, the Coldness of the Water conduceth to the same.

542 The *Moss* of Trees, is a kind of Hair; For it is the Juyce of the Tree, that is Excerned, and doth not Assimilate. and upon great Trees the *Moss* gathereth a Figure, like a Leaf.

543 The Moistest Sort of Trees yield little *Moss*; as we see in *Asps*, *Poplars*, *Willows*, *Beeches*, &c. Which is partly caused for the Reason thath been given, of the frank Putting up of the Sap into the Boughes; and partly, for that the Barks of those Trees, are more Close, and Smooth, than those of Oaks, and *Asbes*; Whereby the *Moss* can the hardlier issue out.

544 In Clay-Grounds, all Fruit-Trees grow full of *Moss*, both upon Body and Boughes; Which is caused, partly by the Coldness of the Ground, whereby the *Plants* nourish less; And partly by the Toughness of the Earth, whereby the Sap is shut in, and cannot get up, to spread so frankly, as it should do.

545 We have said heretofore, that if Trees be Hide-Bound, they wax less Fruitfull, and gather *Moss*: And that they are holpen by Hacking, &c. And therefore by the Reason of Contraries, if Trees be bound in with Cords, or some outward Bands, they will put forth more *Moss*: Which (I think) happeneth to Trees that stand Bleak, and upon the Cold Winds. It would also be tried, whether, if you cover a Tree, somewhat thick upon the top, after his Powling, it will not gather more *Moss*. I think also, the Watring of Trees with Cold Fountain Water, will make them grow full of *Moss*.

546 There is a *Moss* the Perfumers have, which cometh out of Apple-Trees, that hath an Excellent Sent. *Quare* particularly for the Manner of the Growth, and the Nature of it. And for this Experiments sake, being a thing of Price, I have set down the last Experiments, how to multiply, and call on *Mosses*.

Next unto *Moss*, I will speak of *Mushromes*; Which are likewise an Unperfect Plant. The *Mushromes* have two strange Properties; The One, that they yield so Delicious a Meat; The Other, that they come up so hastily, as in a Night, and yet they are Unfown. And therefore such as are Upstarts in State, they call

call, in reproach, *Mushromes*. It must needs be therefore, that they be made of much *Moisture*; And that *Moisture* Fat, Gross, and yet somewhat Concocted. And (indeed) we find, that *Mushromes* cause the *Accident*, which we call *Incubus*, or the *Mare*, in the *Stomach*. And therefore the *Surfet* of them may Suffocate, and Emppoyson. And this sheweth, that they are Windy; And that Windiness is Gross, and Swelling; Not Sharp, or Griping. And upon the same reason *Mushromes* are a venereous Meat.

It is reported, that the *Bark* of *White*, or *Red Poplar*, (which are of the Moistest of *Trees*) cut small, and cast into *Furrowes* well dunged, will cause the ground to put forth *Mushromes*, at all *Seasons* of the *Year*, fit to be eaten. some adde to the Mixture *Leaven* of *Bread*, resolved in *Water*.

It is reported, that if a *Hilly-Field*, where the *Stubble* is standing, be set on *Fire*, in the *Showry Season*, it will put forth great Store of *Mushromes*.

It is reported, that *Harts-Horne*, *Shaven*, or in small *Pieces*, mixed with *Dung*, and *watred*, putteth up *Mushromes*. And we know that *Harts-Horn* is of a Fat and Clammy Substance: And it may be *Ox-Horne* would do the like.

It hath been reported, though it be scarce credible, that *Ivy* hath grown out of a *Stags-Horne*; which they suppose did rather come from a *Confrication* of the *Horne* upon the *Ivy*, than from the *Horne* it self. There is not known any Substance, but *Earth*; and the *Procedures* of *Earth*, (as *Tile-Stone*, &c.) that yieldeth any *Moss*, or *Herby Substance*. There may be *Triall* made of some *Seeds*, as that *Fennell-Seed*, *Mustard-Seed*, and *Rape-Seed*, put into some little *Holes*, made in the *Hornes* of *Stags*, or *Oxen*, to see if they will grow.

There is also another *Unperfect Plant*, that (in shew) is like a great *Mushrome*: And it is sometimes as broad as ones *Hat*; which they call a *Toads-Stool*: But it is not *Esculent*; And it groweth (commonly) by a dead *Stub* of a *Tree*; and likewise about the *Roots* of *Rotten-Trees*: and therefore seemeth to take his *Juyce* from *Wood Putrified*. Which sheweth, by the way, that *Wood Putrified* yieldeth a frank *Moisture*.

There is a *Cake* that groweth upon the *Side* of a *Dead Tree*, that hath gotten no Name, but it is large, and of a *Chestnut Colour*, and hard and pithy; Whereby it should seem, that even *Dead Trees* forget not their *Putting forth*; No more than the *Carcasses* of *Mens Bodies* that put forth *Hair*, and *Nails*, for a time.

There is a *Cod*, or *Bag*, that groweth commonly in the *Fields*; that at the first is hard like a *Tennis-Ball*, and white; and after groweth of a *Mushrome Colour*, and full of light *Dust* upon the *Breaking*: And is thought to be dangerous for the *Eyes*, if the *Powder* get into them; and to be good for *Kibes*. Belike it hath a *Corrosive*, and *Fretting Nature*.

There is an *Herb* called *Jewes-Ear*; that groweth upon the *Roots*, and *Lower Parts* of the *Bodies* of *Trees*; especially of *Elders*, and sometimes *Asbes*. It hath a strange *Propriety*; For in *Warm Water*, it swelleth, and openeth extremely. It is not green, but of a dusky brown Colour. And it is used for *Squinancies*, and *Inflammations* in the *Throat*; whereby it seemeth to have a *Mollifying*, and *Lenifying Vertue*.

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There is a kind of *Spongie Excreſcence*, which groweth chiefly upon the *Roots* of the *Laſer-Trees*; and ſometimes upon *Cedar*, and other *Trees*. It is very *White*, and *Light*, and *Friable* : Which we call *Agarick*. It is famous in *Phyſick* for the *Purging* of *Tough ſlegme*. And it is alſo an excellent *Opener* for the *Liver* : But *Offenſive* to the *Stomach*; and in *Taſte* it is, at the firſt, *Sweet* and after *Bitter*.

556

We find no *Super-Plant*, that is a formed *Plant*, but *Miſſeltoe*. They have an idle *Tradition*, that there is a *Bird*, called a *Miſſel-Bird*, that feedeth upon a *Seed*, which many times ſhe cannot diſgeſt, and ſo expelleth it whole with her *Excrement* : which falling upon a *Bough* of a *Tree*, that hath ſome *Riſt*, putteth forth *Miſſeltoe*. But this is a *Fable*; for it is not probable, that *Birds* ſhould feed upon that they cannot diſgeſt. But allow that, yet it cannot be for other *Reaſons* : For *Fiſt*, it is found but upon certain *Trees*; and thoſe *Trees* bear no ſuch *Fruit*, as may allure that *Bird* to ſit and feed upon them. It may be, that *Bird* feedeth upon the *Miſſeltoe-Berries* and ſo is often found there; Which may have given occaſion to the *Tale*. But that which maketh an *End* of the queſtion, is, that *Miſſeltoe* hath been found to put forth under the *Boughs*, and not (only) above the *Boughs* : So it cannot be any thing that falleth upon the *Bough*. *Miſſeltoe* groweth chiefly upon *Crab-Trees*, *Apple-Trees*, ſometimes upon *Haeſes*; and rarely upon *Oakes*; the *Miſſeltoe* whereof is counted very *Medicinall*. It is ever green, *Winter* and *Summer*; and beareth a *White Glittering Berry* : And it is a *Plant*, utterly differing from the *Plant* upon which it groweth. Two things therefore may be certainly ſet down : *Fiſt*, that *Super-fatation* muſt be by *Abundance* of *Sap*, in the *Bough* that putteth it forth : *Secondly*, that that *Sap* muſt be ſuch, as the *Tree* doth excerne, and cannot affimilate; for elſe it would go into a *Bough*; and beſides, it ſeemeth to be more *Fat* and *Unctuous*, than the *Ordinary Sap* of the *Tree*; both by the *Berry*, which is *Clammie*; and by that it continueth green, *Winter* and *Summer*, which the *Tree* doth not.

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This *Experiment* of *Miſſeltoe* may give *Light* to other *Practices*. Therefore *Triall* would be made, by *Ripping* of the *Bough* of a *Crab-Tree*, in the *Bark*; and *VVatring* of the *Wound* every day, with *VVarm VVater Dugged*, to ſee if it would bring forth *Miſſeltoe*, or an ſuch like thing. But it were yet more likely to trie it, with ſome other *VVatring*, or *Anointing*, that were not ſo *Natural* to the *Tree*, as *VVater* is; as *Oyl*, or *Barme* of *Drink*, &c. So they be ſuch things as kill not the *Bough*.

558

It were good to try, what *Plants* would put forth, if they be forbidden to put forth their *Natural Boughs* : *Powl* therefore a *Tree*, and cover it, ſome thickneſs, with *Clay* on the *Top*; and ſee what it will put forth. I ſuppoſe it will put forth *Roots*; For ſo will a *Cions*, being turned down into *Clay* : Therefore, in this *Experiment* alſo, the *Tree* would be cloſed with ſome-what, that is not ſo *Natural* to the *Plant*, as *Clay* is. Trie it with *Leather*, or *Cloth*, or *Painting*, ſo it be not hurtfull to the *Tree*. And it is certain, that a *Brake* hath been known to grow out of a *Pollard*.

559

A *Man* may count the *Prickles* of *Trees* to be a kind of *Excreſcence*, For they will never be *Boughs*, nor bear *Leaves*. The *Plants* that have *Prickles*, are *Thornes*, black and white; *Brier*, *Roſe*, *Limmons-Trees*, *Crab-Trees*, *Goſe-Berry*, *Berberry*; Theſe have it in the *Bough*; The *Plants* that have *Prickles* in the *Leaſe*, are, *Holly*, *Juniper*, *VVhin-tuſh*, *Thiſtle*; *Nettles* alſo have a ſmall *Venemous Prickle*; So hath *Borrage*, but harmeleſs. The *Cauſe* muſt be *Haeſty Putting forth*; *VVant* of *Moifture*; And the *Cloſeneſs* of the *Bark*. For the

the Haste of the Spirit to put forth, and the Want of Nourishment to put forth a Bough, and the Closenesse of the Bark, cause Prickles in Boughs; And therefore they are ever like a Pyramis, for that the Moisture spendeth after a little Putting forth. And for Prickles in Leaves, they come also of Putting forth more Juycce into the Lease, that can spread in the Lease smooth; and therefore the Leaves otherwise are Rough, as Borrage and Nettles are. As for the Leaves of Holly, they are smooth but never plain, but as it were with Folds for the same Cause.

There be also Plants, that though they have no Prickles, yet they have a Kinde of Downey or Velvet Rine, upon their Leaves; As Rose-Campion, Stock-Gilly-Flowers, Colts-Foot; which Downe or Napcometh of a Subtil Spirit, in a soft or fat Substance. For it is cerrain, that both Stock-Gilly-Flowers, and Rose-Campions, stamped, have been applyed, (with successe,) to the Wrests of those that have had Tertian, or Quartan Agues; and the Vapour of Colts-Foot have a Sanative vertue. towards the Lungs; and the Leaf also is Healing in Surgery.

Another kind of Excrecence is an Exudation of Plants, joyned with Putrefaction; as we see in Oak-Apples, which are found chiefly upon the Leaves of Oakes; and the like upon Willowes: And Countrey People have a kind of Prediction, that if the Oak-Apple, broken, be full of Worms, it is a signe of a Pestilent Year; Which is a likely thing, because they grow of Corruption.

There is also upon Sweet, or other Brier, a fine Tuft, or Brush of Mosse, of divers Colours; Which if you cut, you shall ever finde full of little white Worms.

It is certain, that Earth taken out of the Foundations of Kaults and Houses, Land Bottomes of Wells and then put into Pots, will put forth fundry kinds of Herbs: But some Time is required for the Germination; For if it be taken, but from a Fathome deep, it will put forth the First-Year; if much deeper, not till after a Year or Two.

The Nature of the Plants growing out of Earth so taken up, doth follow the Nature of the Mould it selfe; as if the Mould be Soft and Fine, it putteth forth Soft Herbs; as Grasse, Plantine, and the like; If the Earth be Harder and Courser, it putteth forth Herbs more Rough, as Thistles, Firres, &c.

It is Common Experience, that where Alleys are close Gravelled, the Earth putteth forth, the first year, Knot-Grasse, and after Spire-Grasse. The Cause is, for that the Hard Gravel, or Pebble at the first laying, will not suffer the Grasse to come forth upright, but turneth it to finde his way where it can; but after that the Earth is somewhat loosened at the Top, the Ordinary Grasse cometh up.

It is reported, that Earth being taken out of Shady and Watry Woods, some depth, and Potted, will put forth Herbs of a Fat and Juicy Substance; As Penny-wort, Purslane, Houseleek, Penney-Royall, &c.

The Water also doth send forth Plants, that have no Roots fixed in the Bottome; But they are lesse Perfect Plants being almost but Leaves, and those Small ones: Such is that we call Duck-weed; Which hath a Lease no bigger then a Thyme Lease, but of a fresher Green, and putteth forth a little String into the Water, far from the Bottome. As for the Water-Lilly, it hath a Root in the Ground: And so have a Number of other Herbs that grow in Ponds,

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Experiments
in Confort
touching the
Producing of
Perfect Plants
without Seeds.

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It is reported by some of the *Ancients*, and some *Modern* Testimony likewise, that there be some *Plants*, that grow upon the Top of the *Sea*; Being supposed to grow of some *Concretion* of *Slime* from the *Water*, where the *Sun* beateth hot, and where the *Sea* stirreth little. As for the *Alga Marina*, (*Sea-weed*) and *Eringium*, (*Sea-Thistle*) both the *Roots*; but have *Sea-weed* under the *Water*, the *Sea-Thistle* but upon the *Shore*.

569

The *Ancients* have noted, that there are some *Herbs*, that grow out of *Snow*, laid up close together, and *Putrified*; and that they are all *Bitter*; And they name one especially, *Flomus*, which we call *Moth-Mullein*. It is certain, that *Worms* are found in *Snow* commonly, like *Earth worms*; And therefore it is not unlike, that it may likewise put forth *Plants*.

570

The *Ancients* have affirmed, that there are some *Herbs* that grow out of *Stone*, Which may be, for that it is certain, that *Toads* have been found in the Middle of a *Free-Stone*. We see also that *Flints* lying above *Ground* gather *Mosse*; And *VV*all *Flowers*, and some other *Flowers*, grow upon *Walls*, But whether upon the Main *Brick* or *Stone*, or whether out of the *Lime*, or *Chinks*, is not well observed. For *Elders* and *Asbes* have been seen to grow out of *Steeple*; But they manifestly grow out of *Clefts*; In so much as, when they grow big, they will disjoine the *Stone*. And besides it is doubtfull, whether the *Mortar* it selfe putteth it forth, or whether some *Seeds* be not let fall by *Birds*. There be likewise *Rock-Herbs*; But I suppose those are, where there is some *Mould* or *Earth*. It hath likewise been found that great *Trees*, growing upon *Quarries*, have put down their *Root* into the *Stone*.

571

In some *Mines* in *Germany*, as is reported, there grow in the Bottom *Vegetables*; And the *Worke-Folks* use to say, they have *Magicall Vertues*; And will not suffer men together them.

572

The *Sea-Sands* seldome bear *Plants*. Where of the *Cause* is yeilded, by some of the *Ancients*, for that the *Sun* exaleth the *Moisture*, before it can incorporate with the *Earth*, and yeeld a *Nourishment* for the *Plant*. And it is affirmed also, that *Sand* hath (alwayes) his *Root* in *Clay*; And that there be no *Veines* of *Sand*, any great depth within the *Earth*.

573

It is certain, that some *Plants* put forth for a time, of there own *Store*, without any *Nourishment* from *Earth*, *Water*, *Stone*, &c. Of which Vide the *Experiment. 29.*

Experiments
in Confort
touching
Forraigne Plants

574

It is reported, that *Earth* that was brought out of the *Indies*, and other *Remote Countries*, for *Ballast* for *Ships*, cast upon some *Grounds* in *Italy*, did put forth *Forraigne Herbs*, to us in *Europe* not known; and, that which is more, that of their *Roots*, *Barks*, and *Seeds*, contused together, and mingled with other *Earth*, and well watred with *Warme Water*, there came forth *Herbs*, much like the *Other*.

575

Plants, brought out of *Hot-Countries*, will endeavour to put forth, at the same *Time*, that they do usually do in their own *Climate*; and therefore to preserve them, there is no more required, than to keep them from the *Injury* of putting back by *Cold*. It is reported also, that *Graine* out of the *Hotter Countries* translated into the *Colder*, will be more foreward, than the ordinary *Graine* of the *Cold Country*. It is likely that this will prove better in *Grains*, than in *Trees*; For that *Graines* are but *Annually*; and so the *Vertue* of the *Seed* is not worn out; Whereas in a *Tree*, it is embased by the *Ground*, to which it is *Removed*.

576

Many *Plants*, which grow in the *Hotter-Countries*, being set in the *Colder*,

der, will nevertheless, even in those Cold Countries, being sown of *Seeds* late in the *Spring*, come up and abide most part of the *Summer*; as we find it in *Orange*, and *Limmon-Seeds*, &c. The *Seeds* whereof, sown in the End of *April*, will bring forth excellent *Sallets*, mingled with other *Herbs*. And I doubt not, but the *Seeds* of *Clove-Trees*, and *Pepper-Seeds*, &c. If they could come hither *Green* enough to be sown, would do the like.

Here be some *Flowers*, *Blossomes*, *Grains*, and *Fruits*, which come more Early; and others which come more Late in the Year. The *Flowers* that come early, with us, are, *Prime-Roses*, *Violets*, *Anemonies*, *Water-Daffodillies*, *Crocus Vernus*, and some early *Tulippa's*. And they are all Cold Plants, which therefore, (as it should seem) have a quicker Perception of the Heat of the Sun increasing, than the Hot Herbs have; as a cold hand will sooner finde a little warmth, than a hot. And those that come next after, are *Wall-Flowers*, *Cowslips*, *Hyacinths*, *Rose-Mary-Flowers*, &c. And after them *Pincks*, *Roses*, *Flowerdeluces* &c. And the latest are *Gilly Flowers*, *Holly-Oaks*, *Larkes-Foot*, &c. The earliest Blossoms are, the Blossoms of *Peaches*, *Almonds*, *Cornelians*, *Mezerions*, &c. And they are of such Trees, as have much Moisture, either Watery, or Oily. And therefore *Crocus Vernus* also, being an Herb, that hath an Oily Juice, putteth forth early. For those also finde the Sun sooner than the Drier Trees. The Grains are, first, *Rie* and *Wheat*; then *Oats* and *Barley*; then *Pease* and *Beanes*: for though *Green Pease* and *Beans* be eaten sooner, yet the Drie Ones, that are used for *Horse-Meat*, are ripe last; and it seemeth that the Fatter Graine cometh first. The Earliest Fruits are, *Strawberries*, *Cherries*, *Gooseberries*, *Corrans*; And after them *Early Apples*, *Early Pears*, *Apricots*, *Rasps*; And after them, *Damofins*, and most kind of *Plums*, *Peaches*, &c. And the latest are *Apples*, *Wardens*, *Grapes*, *Nuts*, *Quinces*, *Almonds*, *Sloes*, *Brier-berries*, *Heps*, *Medlars*, *Services*, *Cornelians*, &c.

Experiments
in Confort
touching the
Seasons in
which Plants
come forth.

577

It is to be noted, that (commonly) Trees that ripen latest, Blossome soonest: As *Peaches*, *Cornelians*, *Sloes*, *Almonds*, &c. And it seemeth to be a Work of Providence, that they Blossome so soon; For otherwise they could not have the Sun long enough to ripen.

578

There be Fruits, (but rarely) that come twice a Year; as some *Pears*, *Strawberries*, &c. And it seemeth they are such, as abound with Nourishment; whereby after one Period, before the Sun waxeth too weak, they can endure another. The *Violet* also, amongst *Flowers*, cometh twice a Year: Especially the *Double White*; and that also is a Plant full of Moisture. *Roses* come twice, but it is not without Cutting, as hath been formerly said.

579

In *Muscovia*, though the *Corne* come not up, till late *Spring*, yet their Harvest is as early as ours. The Cause is, for that the Strength of the ground is kept in with the *Snow*; and we see with us, that if it be a long *Winter*, it is commonly a more Plentiful Year: And after those kind of *Winters* likewise, the *Flowers*, and *Corne*, which are Earlier, and Later, do come commonly at once, and at the same time; Which troubleth the Husbandman many times; For you shall have *Red-Roses*, and *Damask-Roses*, come together; and likewise the Harvest of *Wheat* and *Barley*. But this happeneth ever, for that the Earlier stayeth the Later; and not that the Later cometh sooner.

580

There be divers Fruit-Trees, in the Hot Countries, which have Blossomes, and Young Fruit, and Ripe Fruit, almost all the Year, succeeding one another. And it is said, the *Orange* hath the like with us, for a great Part of Summer;

581

Summer ; and so also hath the *Fig*. And no doubt, the *Natural Motion* of *Plants*, is to have so : But that either they want *Juyce* to spend ; Or they meet with the *Cold* of the *Winter*. And therefore this *Circle* of *Ripening* cannot be, but in *Succulent Plants*, and *Hot Countries*.

582

Some *Herbs* are but *Annually*, and die, *Root* and all, once a *Year*; as *Borage*, *Lettuce*, *Cucumbers*, *Muske-Melons*, *Basill*, *Tobacco*, *Mustard-Seed*, and all kindes of *Corn*; some continue many *Years*, as *Hyssope*, *Germander*, *Lavender*, *Fennell*, &c. The *Cause* of the *Dying* is double; the first is, the *Tender-nesse*, and *Weakenesse* of the *Seed*, which maketh the *Period* in a small time, as it is in *Borage*, *Lettuce*, *Cucumbers*, *Corn*, &c. And therefore none of these are *Hot*. The other *Cause* is, for that some *Herbs* can worse endure *Cold*, as *Basill*, *Tobacco*, *Mustard-Seed*. And these have (all) much *Heat*.

583
Experiments
in Confort
touching the
Lasting of
Herbs and
Trees.

The *Lasting* of *Plants* is most in those that are *Largest* of *Body*, as *Oaks*, *Elme*, *Chef-Nut*, the *Loat-Tree*, &c. And this holdeth in *Trees*, but in *Herbs* it is often contrary; for *Borage*, *Coleworts*, *Pompions*, which are *Herbs* of the *Largest Size*, are of small *Durance*; Whereas *Hyssope*, *Winter-Savory*, *Germander*, *Thyme*, *Sage*, will last long. The *Cause* is, for that *Trees* last according to the *Strength*, and *Quantity* of their *Sap* and *Juyce*; being well munit by their *Bark*, against the *Injuries* of the *Air*: But *Herbs* draw a weak *Juyce*; and have a soft *Stalk*; and therefore those amongst them which last longest, are *Herbs* of *strong Smell*, and with a *stikie Stalk*.

584

Trees that bear *Mast*, and *Nuts*, are commonly more lasting, than those that bear *Fruits*; especially the *Moister Fruits*, As *Oaks*, *Beeches*, *Chef-Nuts*, *Wall-Nuts*, *Almonds*, *Pine-Trees*, &c. last longer than *Apples*, *Pears*, *Plums*, &c. The *Cause* is, the *Fatnesse*, and *Oilynesse* of the *Sap*; which ever wasteth less, than the more *Watry*.

585

Trees that bring forth their *Leaves* late in the *Year*, and cast them likewise late, are more lasting, than those that sprout their *Leaves* early, or shed them betimes. The *Cause* is, for that the late *Coming forth* sheweth a *Moisture* more fixed; and the other loose, and more easily resolved. And the same *Cause* is, that *Wild-Trees* last longer than *Garden-Trees*; and in the same kinde, those whose *Fruit* is *Acide*, more than those whose *Fruit* is sweet.

586

Nothing procureth the *Lasting* of *Trees*, *Bushes*, and *Herbs*, so much, as often *Cutting*: For every *Cutting* causeth a *Renovation* of the *Juyce* of the *Plant*; that it neither goeth so far, nor riseth so faintly, as when the *Plant* is not *Cut*: Insomuch as *Annually Plants*, if you cut them seasonably, and will spare the use of them, and suffer them to come up still young, will last more *Years* than one; as hath been partly touched; Such as is *Lettuce*, *Purslane*, *Cucumber*, and the like. And for *Great Trees*, we see almost all *Overgrown Trees*, in *Church-yards*, or near ancient *Building*, and the like, are *Pollards*, or *Dottards*, and not *Trees* at their full height.

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Some *Experiment* would be made, how by *Art* to make *Plants* more *Lasting*, than their ordinary *Period*; as to make a *Stalk* of *Wheat*, &c. Last a whole year. You must ever presuppose, that you handle it so, as the *Winter* killeth it not; For we speak only of *Prolonging* the *Naturall Period*. I conceive, that the *Rule* will hold; that whatsoever maketh the *Hreb* come later, than at his time, will make it last longer time: It were good to trie it, in a *Stalk* of *Wheat*, &c. set in the *Shade*, and encompassed with a *Case* of *Wood*, not touching the *Straw*, to keep out open *Air*.

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As for the *Preservation* of *Fruits*, as well upon the *Tree*, or *Stalke*,

as gathered, we shall handle it under the Title of Conservation of Bodies,

THe Particular Figures of Plants we leave to their Descriptions; but some few Things in general, we will observe. Trees and Herbs, in the growing forth of their Boughs, and Branches, are not Figured, and keep no order. The Cause is, for that the Sap, being restrained in the Rinde, and Bark, breaketh not forth at all; (as in the Bodies of Trees, and Stalks of Herbs,) till they begin to branch; and then, when they make an Eruption, they break forth casually, where they find best way, in the Bark, or Rinde. It is true, that some Trees are more scattered in their Boughs; as Sallow-Trees, Warden-Trees, Quince-Trees, Medlar-Trees, Limmon-Trees, &c. Some are more in the form of a Pyramid, and come almost to rodd; as the Pear-Trees, (which the Criticks will have to borrow his name of π ; Fire) Orange-Trees, Firre-Trees, Service-Trees, Lime-Trees, &c. And some are more spread and broad; as Beeches, Horne-beame, &c. The rest are more indifferent. The Cause, of Scattering the Boughs, is, the hasty breaking forth of the Sap; and therefore those Trees rise not in a Body of any Height, but Branch near the Ground. The Cause, of the Pyramid, is, the keeping in of the Sap; long before it branch, and the spending of it, when it, beginneth to branch, by equall degrees; The Spreading is caused, by the Carrying up of the Sap, plentifully, without Expençe; and then putting it forth speedily, and at once.

There be divers Herbs, but no Trees, that may be said to have some kind of Order, in the putting forth of their Leaves: For they have Joynts, or Knuckles, as it were stops in their Germination; as have Gilly-Flowers, Pinks, Fennell, Corn, Reeds, and Canes. The Cause whereof is, for that the Sap ascendeth unequally, and doth (as it were) tire and stop by the way. And it seemeth, they have some Closenesse, and Hardnesse in their Stalk, which hindereth the Sap from going up, untill it hath gathered into a Knot, and so is more urged to put forth. And therefore, they are most of them hollow, when the Stalk is drie: as Fennell Stalks, Stubble, and Canes.

Flowers have (all) exquisite Figures; and the Flower-Numbers are (chiefly) Five and Four; as in Prime-Roses, Bryer-Roses, Single-Musk-Roses, Single-Pinks, and Gilly-Flowers, &c. which have five Leaves; Lillies, Flower-de-luces, Borage, Buglosse, &c. which have four Leaves. But some put forth Leaves not Numbered; but they are ever small Ones; as Mary-Golds, Trifole, &c. We see also, that the Sockets, and Supporters of Flowers, are Figured; as in the Five Brethren of the Roses, Sockets of Gilly-Flowers, &c. Leaves also are all Figured; some Round; some Long; none Square; and many jagged on the sides; which Leaves of Flowers seldome are. For, I account, the jagging of Pinks, and Gilly-Flowers, to be like the inequality of Oak-Leaves, of Vine-Leaves, or the like; but they seldome or never have any small Pawles.

OF Plants some few put forth their Blossomes before their Leaves; as Almonds, Peaches, Cornelians, Black-Thorne, &c. But most put forth some Leaves before their Blossomes; as Apples, Pears, Plums, Cherry, White-Thorne, &c. The Cause is, for that those, that put forth their Blossoms first, have either an Acute and Sharp Spirit; (and therefore commonly they all put forth early in the Spring, and ripen very late; as most of the Particulars before mentioned;) Or else an Oily Juice, which is apter to put out Flowers, than Leaves.

Of plants some are Green all Winter; others cast their Leaves. There are Green all Winter; Holly, Ivy, Box, Firre, Eugh, Cypressse, Juniper, Bayes, Rose-Mary, &c. The Cause of the holding Green, is the Close and Compact Sub-

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stance

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in Consort
touching the
several Figures
of Plants.

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in Consort,
touching some
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Differences in
Plants.

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stance of their *Leaves*, and the *Pedicles* of them. And the Cause of that again, is, either the *Tough* and *Viscous* *Juice* of the *Plant*; or the *Strength* and *Heat* thereof. Of the first sort is *Holly*; which is of so *Viscous* a *Juice*, as they make *Bindlime* of the *Bark* of it. The *Stalk* of *Ivy* is *tough*, and not *fragile*, as we see it in other small *Twigs* drie. *Firre* yieldeth *Pitch*. *Box* is a fast and heavy *Wood*, as we see it in *Bouls*. *Eugh* is a strong and tough *Wood*, as we see it in *Bowes*. Of the second sort is *Juniter*, which is a *Wood* odorate; and maketh a hot *Fire*. *Bayes* is likewise a Hot and Aromaticall *Wood*; and so is *Rose-Mary* for a *Shrub*. As for the *Leaves*, their *Density* appeareth, in that either they are smooth and shining, as in *Bayes*, *Holly*, *Ivy*, *Box*, &c. Or in that they are hard and *Spirie*, as in the rest. And *Triall* would be made of *Grafting* of *Rose-Mary*, and *Bayes*, and *Box*, upon a *Holly* *Stock*; because they are *Plants* that come all *Winter*. It were good to trie it also with *Grafts* of other *Trees*, either *Fruit-Trees*, or *Wild-Trees*; to see whether they will not yield their *Fruit*, or bear their *Leaves*, later, and longer in the *Winter*; because the *Sap* of the *Holly* putteth forth most in the *Winter*. It may be also a *Mezerion-Tree*, grafted upon a *Holly*, will prove both an *Earlier*, and a *Greater* *Tree*.

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There be some *Plants*, that bear no *Flower*, and yet bear *Fruit*: There be some, that bear *Flowers*, and no *Fruit*: There be some, that bear neither *Flowers*, nor *Fruit*. Most of the great *Timber-Trees*, (as *Oaks*, *Beeches*, &c.) bear no apparent *Flowers*: Some few (likewise) of the *Fruit Trees*; as *Mulberry*, *Walnuts*, &c. And some *shrubs*, (as *Juniper*, *Holly*, &c.) bear no *Flowers*. Divers *Herbs* also bear *Seeds*, (which is as the *Fruit*;) and yet bear no *Flowers*; as *Purslane*, &c. Those that bear *Flowers*, and no *Fruit*, are few; as the *Double Cherry*, the *Sallow*, &c. But for the *Cherry*, it is doubtfull, whether it be not by *Art*, or *Culture*; for if it be by *Art*, then *Triall* would be made, whether *Apples*, and other *Fruits* *Blossomes*, may not be doubled. There are some Few, that bear neither *Fruit*, nor *Flower*; as the *Elme*, the *Poplars*, *Box*, *Braks*, &c.

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There be some *Plants*, that shoot still upwards, and can support themselves, as the greatest Part of *Trees*, and *Plants*: There be some other, that Creep along the *Ground*; or Wind about other *Trees*, or *Props*, and cannot support themselves; as *Vines*, *Ivy*, *Bryar*, *Briony*, *Wood-bines*, *Hops*, *Climatis*, *Camomill*, &c. The Cause is, (as hath been partly touched,) for that all *Plants*, (naturally) move upwards; but if the *Sap* put up too fast, it maketh a slender *Stalk*, which will not support the weight: And therefore these latter sort are all swift and hasty *Comers*.

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Experiments
in Confort
touching all
manner of
Composts, and
Help, of
Ground.

The first and most Ordinary *Help* is *Stercoration*. The *Sheeps-Dung* is one of the best; and next, the *Dung* of *Kine*: And Thirdly, that of *Horses*: Which is held to be somewhat too hot, unlesse it be mingled. That of *Pigeons* for a *Garden*, as a small Quantity of *Ground*, Excelleth. The Ordering of *Dung* is; If the *Ground* be *Arable*; to spread it immediately before the *Ploughing*, and *Sowing*; and so to *Plough* it in: For if you spread it long before, the *Sunne* will draw out much of the *Fatnesse* of the *Dung*: If the *Ground* be *Grazing Ground*; to spread it somewhat late towards *Winter*; That the *Sunne* may have the lesse *Power* to drie it up. As for special *Composts* for *Gardens*, (as a *Hot Bed*, &c.) we have handled them before.

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The Second Kind of *Compost* is, the spreading of divers *Kinds* of *Earth*; as *Marle*, *Chalk*, *Sea-Sand*, *Earth* upon *Earth*, *Pond-Earth*; and the *Mixtures* of them. *Marle* is thought to be the best; as having most *Fatnesse*. And not *Heating*

Heating the *Ground* too much. The next is *Sea-Sand*; which (no doubt) obtained a special Vertue, by the *Salt*; for *Salt* is the first Rædiment of life. *Chalk* over heateth the *Ground* a little. And therefore is best upon *Cold Clay-Grounds*, or *Moist Grounds*: But I heard a great Husband say, that it was a common Errour to think that *Chalk* helpeth *Arable Grounds*; but helpeth not *Grazing Grounds*, Whereas (indeed) it helpeth *Grass*, as well as *Corn*: but that which breedeth the Errour is, because after the *Chalking* of the *Ground*, they wear it out with many *Crops*, without rest; and then (indeed) afterwards it will bear little *Grass*, because the *Ground* is tyred out. It were good to try the laying of *Chalk* upon *Arable Grounds*, a little while before *Ploughing*; and to *Plough* it in, as they do the *Dung*; But then it must be Friable first, by *Rain* or *Lying*: As for *Earth* it compasseth it selfe; For I knew a great *Garden*, that had a *Field* (in a manner) poured upon it; And it did bear *Fruit* excellently the first year of the *Planting*: for the *Surface* of the *Earth* is ever the *Fruitfullest*. And *Earth* so prepared hath a double *Surface*. But it is true, as I conceive, that such *Earth* as hath *Salt Peter* bred in it if you can procure it without too much charge, doth excell. The way to hasten the *Breeding* of *Salt Peter*, is to forbid the *Sun*, and the *Growth* of *Vegetables*. And therefore, if you make a large *Hovel*, thatched, over some *Quantity* of *Ground*; Nay, if you do but plancke the *Ground* over; it will breed *Salt-Petre*. As for *Pond-Earth* or *River-Earth*, it is a very good *Compost*; Especially if the *Pond* have been long uncleansed, and so the *Water* be not too hungry; and I judge it will be yet better, if there be some *Mixture* of *Chalk*.

The Third Help of *Ground*, is, by some other *Substances*, that have a Vertue to make *Ground* Fertile; though they be not meerly *Earth*: wherein *Ashes* excell; Inasmuch as the *Countries* about *Aetna* and *Vesuvius*, have a kind of *Amends* made them, for the *Mischief* the *Eruptions* (many times) do, by the exceeding *Fruitfulnessse* of the *Soile*, caused by the *Ashes* scatered about. *Soot* also, though thin, spread in a *Field* or *Garden*, is tried to be a very good *Compost*. For *Salt* it is too costly; But it is tried, that mingled with *Seed-Corn* and sown together, it doth good: And I am of Opinion, that *Chalk* in *Powder* mingled with *Seed Corn*, would do good; Perhaps as much as *Chalking* the *Ground* all over. As for the *Steeping* of the *Seeds*, in several *Mixtures* with *Water*, to give them *Vigour*; or *Watering Grounds* with *Compost-water*; we have spoken of them before.

The Fourth Help of *Ground* is, the *Suffering* of *Vegetables* to die into the *Ground*; And so to Fatten it; as the *Stubble* of *Corn*, Especially *Pease*, *Brakes* cast upon the *Ground*, in the beginning of *Winter* will make it very *Fruitfull*. It were good (also) to trie whether *Leaves* of *Trees* swept together, with some *Chalk* and *Dung* mixed, to give them more heart, would not make a good *Compost*: For there is nothing lost, so much as *Leaves* of *Trees* and as they ly scattered and without mixture, they rather make the *Ground* soure than otherwise.

The Fifth Help of *Ground* is *Heat* and *Warmth*. It hath been anciently practised to burn *Heath*, and *Ling*, and *Sedge*, with the vantage of the *Wind*, upon the *Ground*: we see, that *Warmth* of *Walls* and *Enclosures*, mendeth *Ground*. We see also that *Lying open* to the *South* mendeth *Ground*: We see again, that the *Foldings* of *Sheep* help *Ground*, as well by their *Warmth*, as by their *Compost*: And it may be doubted, whether the *Covering* of the *Ground* with *Brakes* in the beginning of the *Winter* (whereof we spake in the last *Experiment*), helpeth it not, by reason of the *Warmth*. Nay some very good

Husbands do suspect, that the gathering up of *Flints*, in *Flinty Ground* and Laying them on *Heaps* (which is much used) is no good *Husbandry* for that they would keep the *Ground Warm*.

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The Sixth *Help of Ground* is, by *Watering* and *Irrigation*; which is in two Manners: The one by *Letting in* and *Shutting out Waters*, at seasonable Times; For *Water*, at some Seasons and with reasonable Stay doth good; But at some other Seasons, and with too long Stay, doth hurt. And this serveth onely for *Meadows*, which are along some *River*. The other way is to bring *Water*, from some *Hanging Grounds*, where there are *Springs*, into the *Lower Grounds*, carrying it in some long *Furrowes*; And from those *Furrowes*, drawing it traverse to spread the *Water*. And this maketh an Excellent Improvement, both for *Corn*, and *Grasse*. It is the richer, if those *Hanging Grounds*, be fruitfull, because it washeth off some of the Fatness, of the *Earth*: But howsoever it profiteth much. Generally where there are great overflows in *Fens*, or the like, the drowning of them in the *Winter*, maketh the *Summer* following more fruitfull: The Cause may be for that it keepeth the *Ground* warm, and nourisheth it: But the *Fen-Men* hold, that the *Sewers* must be kept so, as the *Water* may not stay too long in the *Spring* till the *Weeds* and *Sedge* be grown up; For then the *Ground* will be like a *Wood* which keepeth out the *Sun*; And so continueth the wet; Whereby it will never graze (to purpose) th at year. Thus much for *Irrigation*. But for *Avoidances*, and *Drainings* of water, where there is too much, and the *Helps of Ground* in that kind, we shall speak of them in another Place.

NATURAL



NATURAL HISTORY.

VII. Century.



THe Differences between *Animate* and *Inanimate Bodies*, we shall handle fully under the Title of *Life*, and *Living Spirits*, and *Powers*. We shall therefore make but a brief Mention of them in this place. The main Differences, are two. All *Bodies* have *Spirits*, and *Pneumatical Parts* within them: But the main Differences between *Animate* and *Inanimate* are two: The first is, that the *Spirits of Things Animate*, are all continued with themselves, and are Branched in *Veines*, and secrete *Sanales*, as *Blood* is: And in *Living Creatures*, the *Spirits* have not only *Branches*, but certain *Sels* or *Seats*, where the *Principal Spirits* do reside, and whereunto the rest do resort: But the *Spirits* in *things Inanimate* are shut in, and cut off by the *Tangible Parts*; and are not pervious one to another; As *Air* is in *Snow*. The second main Difference is, that the *Spirits of Animate Bodies* are all in some degree, (more or less) kindled and inflamed; and have a fine commixture of *Flame*, and an *Aerial Substance*. But *Inanimate Bodies* have their *Spirits* no whit Inflamed, or Kindled. And this Difference consisteth not in the *Heat* or *Coolness* of *Spirits*; For *Cloves* and other *Spices*, *Naptha* and *Petroleum*, have exceeding *Hot Spirits*, (hotter a great deal than *Oyl*, *Wax*, or *Tallow*, &c.) but not Inflamed. And when any of those *Weak* and *Temperate Bodies* come to be Inflamed, than they gather a much greater *Heat*, than others have *Uninflamed*; besides their *Light*, and *Motion*, &c.

The Differences, which are *Secondary*, and proceed from these two *Radical Differences*, are; First, *Plants* are all *Figurate* and *Determinate*, which *Inanimate Bodies* are not; For look how far the *Spirit* is able to spread and continue it self; so far goeth the *Shape* or *Figure*; and then is *Determined*. Secondly, *Plants* do nourish; *Inanimate Bodies* do not: They have an *Accretion*, but no *Alimentation*. Thirdly, *Plants* have a *Period of Life*; which *Inanimate Bodies* have not. Fourthly, they have a *Succession*, and propagation of their *Kind*; which is not in *Bodies Inanimate*.

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in Confort
touching the
Affinities, and
Differences,
between
Plants and
Inanimate
Bodies.

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The *Differences*, between *Plants*, and *Metals*, or *Fossiles*, besides those four before mentioned, (for *Metals* I hold inanimate,) are these: First, *Metals* are more *Durable* than *Plants*: Secondly, they are more *Solid* and *Hard*: Thirdly, they are wholly *Subterrany*; whereas *Plants* are part above *Earth*, and part under *Earth*.

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There be very few *Creatures*, that participate of the *Nature* of *Plants*, and *Metals* both; *Corall* is one of the nearest of both *Kinds*: Another is *Vitrioll*, for that is aptest to sprout with *Moisture*.

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Another speciall *Affinity* is between *Plants* and *Mould*, or *Putrefaction*: For all *Putrefaction*, (if it dissolve not in *Arefaction*) will in the end issue into *Plants*, or *Living Creatures* bred of *Putrefaction*. I account *Mosse*, and *Mushromes*, and *Agarick*, and other of those kinds, to be but *Noulds* of the *Ground*, *Walls*, and *Trees*, and the like. As for *Flesh*, and *Fish*, and *Plants* themselves, and a Number of other things, after a *Mouldiness*, or *Rottenness*, or *Corrupting*, they will fall to breed *Wormes*. These *Putrefactions*, which have *Affinity* with *Plants*, have this *Difference* from them; that they have no *Succession* or *Propagation*; though they *Nourish*, and have a *Period of Life*, and have likewise some *Figure*.

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I left once, by chance, a *Citron* cut, in a close *Room*, for three Summer-moneths, that I was absent; and at my *Return*, there were grown forth, out of the *Pith* cut, *Tufts of Hairs*, an *Inch* long, with little black *Heads*, as if they would have been some *Herb*.

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Plants, and
Living Crea-
tures, And the
Confiner and
Participles of
hem.

The *Affinities* and *Differences*, between *Plants*, and *Living Creatures*, are these that follow. They have both of them *Spirits Continued*, and *Branched*, and also *Inflamed*: But first in *Living Creatures*, the *Spirits* have a *Cell* or *Seat*, which *Plants* have not; as was also formerly said. And secondly, the *Spirits* of *Living Creatures* hold more of *Flame*, than the *Spirits* of *Plants* do. And these two are the *Radical Differences*. For the *Secondary Differences*, they are, as follow. First, *Plants* are all *Fixed* to the *Earth*; Whereas all *Living Creatures* are severed, and of themselves. Secondly, *Living Creatures* have *Locall Motion*; *Plants* have not. Thirdly, *Living Creatures* nourish from their *Upper Parts*, by the *Mouth* chiefly; *Plants* nourish from below, namely from the *Roots*. Fourthly, *Plants* have their *Seed* and *Seminal Parts* uppermost; *Living Creatures* have them lowermost: And therefore it was said, not elegantly alone, but *Philosophically*; *Homo est Planta inversa*; *Man is like a Plant turned upwards*: For the *Root* in *Plants*, is as the *Head* in *Living Creatures*. Fifthly, *Living Creatures* have a more exact *Figure* than *Plants*. Sixthly, *Living Creatures* have more *Diversity* of *Organs* within their *Bodies* and (as it were) *Inward Figures*, than *Plants* have. Seventhly, *Living Creatures* have *Sense*, which *Plants* have not. Eightly, *Living Creatures* have *Voluntary Motion*, which *Plants* have not.

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For the *Difference of Sexes* in *Plants*, they are oftentimes by name distinguished; as *Male Piony*, *Female Piony*; *Male-Rose-mary*, *Female-Rose-mary*; *Hee-Holly*, *Shee-Holly*, &c. But *Generation* by *Copulation* (certainly) extendeth not to *Plants*. The nearest Approach of it, is between the *Hee-Palme*, and the *Shee-Palme*; which, (as they report,) if they grow near, incline the one to the other: Insomuch as, (that which is more strange,) they doubt not to report, that to keep the *Trees* upright from bending, they tie *Ropes*, or *Lines* from the one to the other, that the *Contact* might be enjoyed by the *Contact* of a *Middle Body*. But this may be *Fained*, or at least *Amplified*. Nevertheless, I am apt enough to think, that this same *Binarium* of a
Stronger

Stronger and a Weaker, like unto *Masculine* and *Feminine*, doth hold in all *Living Eodies*. It is confounded sometimes; as in some *Creatures* of *Nature*, wherein no *Marks of Distinction* appear: and it is doubled sometimes; as in *Hermaphrodites*: But generally there is a degree of strength in most *Species*.

The *Participles* or *Confiners* between *Plants* and *Living Creatures*, are such chiefly, as are *Fixed*, and have no *Locall Motion* of *Remove*; though they have a *Motion* in their *Parts*, such as are *Oysters*, *Cockles*, and such like. There is a *Fabulous Narration*, that in the *Northern Countries*, there should be an *Herb* that groweth in the likeness of a *Lamb*, and feedeth upon the *Grass*, in such sort, as it will bear the *Grass* round about. But, I suppose, that the *Figure* maketh the *Fable*; for so we see, there be *Bee-Flowers*, &c. And as for the *Grasse*, it seemeth the *Plant*, having a great *Stalk*, and *Top*, doth prey upon the *Grasse* a good way about, by drawing the *Juyce* of the *Earth* from it.

The *Indian Fig* boweth his *Roots* down so low, in one year, as of it self it taketh *Root* again: And so multiplieth from *Root* to *Root*; making of one *Tree* a kind of *Wood*. The *Cause* is, the *Plenty* of the *Sap*, and the *Softnesse* of the *Stalk*, which maketh the *Bough*, being overladen, and not stiffly upheld, weigh down. It hath *Leaves*, as broad as a little *Target*, but the *Fruit* no bigger than *Beans*. The *Cause* is, for that the continuall *Shade* increaseth the *Leaves*, and abateth the *Fruit*; which nevertheless is, of a pleasant *Taste*. And that (no doubt) is caused, by the *Suppleness* and *Gentleness* of the *Juyce* of that *Plant*, being that which maketh the *Boughs* also so *Flexible*.

It is reported by one of the *Ancients*, that there is a certain *Indian Tree*; having few, but very great *Leaves*, three *Cubits* long, and two broad; and that the *Fruit* being of good *Taste*, groweth out of the *Bark*. It may be, there be *Plants* that pour out the *Sap* so fast, as they have no leisure, either to divide into many *Leaves*, or to put forth *Stalks* to the *Fruit*. With us *Trees* generally have small *Leaves* in comparison. The *Fig* hath the greatest; and next it the *Vine*, *Mulberry*, and *Sycamore*; and the least are those of the *Willow*, *Birch*, and *Thorne*. But there be found *Herbs* with far greater *Leaves* than any *Trees*; as the *Bur*, *Courd*, *Cucumber*, and *Colewort*. The *Cause* is, (like to that of the *Indian Fig*;) the hasty and plentifull Putting forth of the *Sap*.

There be three *Things* in use for *Sweetness*, *Suggar*, *Honey*, *Manna*. For *Sugar*, to the *Ancients* it was scarce known, and little used. It is found in *Canes*: *Quære*, whether to the first *Knuckle*, or further up? and whether the very *Bark* of the *Cane* it self do yield *Sugar* or no? For *Honey*, the *Bee* maketh it, or gathereth it; but I have heard from one, that was industrious in *Husbandry*, that the labour of the *Bee* is about the *Wax*; and that he hath known in the Beginning of *May*, *Honey-Combes* empty of *Honey*, and within a fortnight, when the sweet *Dewes* fall, filled like a *Cellar*. It is reported by some of the *Ancients*, that there is a *Tree* called *Occhus*, in the *Valleys* of *Hircania*, that distilleth *Honey* in the *Mornings*. It is not unlike, that the *Sap* and *Tears* of some *Trees*, may be sweet. It may be also, that some sweet *Juyces*, fit for many uses, may be concocted out of *Fruits*, to the *Thicknesse* of *Honey*, or perhaps of *Suggar*; the likeliest are *Raspins* of the *Sun*, *Figs*, and *Corrans*: The *Meanes* may be enquired.

The *Ancients* report of a *Tree*, by the *Persian Sea*, upon the *Shore-sands*, which

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which is nourished with the *Salt-Water*; And when the *Tide* ebber h, you shall see the *Roots*, as it were, bare without *Bark*, (being, as it seemeth, corroded by the *Salt*) and grasping the *Sands* like a *Crab*; which nevertheless beareth a *Fruit*. It were good to try some *Hard Trees*, as a *Service-Tree*, or *Firre-Tree*, by setting them within the *Sands*.

614 There be of *Plants*, which they use for *Garments*; these that follow, *Hemp*, *Flax*, *Cotton*, *Nettles*, (whereof they make *Nettle Cloth*) *Sericum*, which is a *Growing Silk*; they make also *Cables* of the *Bark* of *Lime-Trees*. It is the *Stalk* that maketh the *Filaceous Matter*, commonly; and sometimes the *Down* that groweth above.

615 They have in some *Countries*, a *Plant* of a *Rosse-colour*, which shutteth in the *Night*, openeth in the *Morning*, and openeth wide at *Noon*; which the *Inhabitants* of those *Countries* say, is a *Plant* that sleepeth. There be *Sleepers* enough then; for almost all *Flowers* do the like.

616 Some *Plants* there are, but rare, that have a *Mossie* or *Downie Root*; and likewise that have a *Number* of *Threads*, like *Beards*, as *Mandrakes*; whereof *Witches*, and *Impostours* make an ugly *Image*, giving it the *Form* of a *Face* at the *Top* of the *Root*, and leave those *Strings* to make a broad *Beard* down to the *Foot*. Also there is a kind of *Nard*, in *Creet*, (being a kind of *Phu*) that hath a *Root* hairy, like a *Rough-footed-Doves* foot. So as you may see, there are of *Roots*, *Bulbous Roots*, *Fibrous Roots*, and *Hirsute Roots*. And, I take it, in the *Bulbous*, the *Sap* fasteneth most to the *Air*, and *Sun*: In the *Fibrous*, the *Sap* delighteth more in the *Earth*, and therefore putteth downward: And the *Hirsute* is a *Middle* between both; that besides the putting forth upwards, and downwards; putteth forth in *Round*.

617 There are some *Tears* of *Trees*, which are kembered from the *Beards* of *Goats*: For when the *Goats* bite and crop them, especially in the *Mornings*, the *Dew* being on, the *Tear* cometh forth, and hangeth upon their *Beards*: Of this sort is some kind of *Ladanum*.

618 The *Irrigation* of the *Plane-Tree* by *Wine*, is reported by the *Ancients*, to make it fruitfull. It would be tried likewise with *Roots*; for upon *Seeds* it worketh no great *Effect*.

619 The way to carry *Forrein Roots*, a long way, is to vessel them close in *Earthen Vessels*. But if the *Vessels* be not very great, you must make some *Holes* in the *Bottom*, to give some refreshment to the *Roots*; Which otherwise (as it seemeth) will decay, and suffocate.

620 The ancient *Cinnamon*, was, of all other *Plants*, while it grew, the *Driest*; and those things, which are known to comfort other *Plants*, did make that more *Sterill*: For in *Showers* it prospered worst: It grew also amongst *Bushes* of other kinds, where commonly *Plants* do not thrive: Neither did it love the *Sun*: There might be one *Cause* of all those *Effects*; Namely, the sparing *Nourishment*, which that *Plant* required. *Quere*, how far *Cassia*, which is now the substitute of *Cinnamon*, doth participate of these things.

621 It is reported by one of the *Ancients*, that *Cassia*, when it is gathered, is put into the *Skins* of *Beasts*, newly fleyed; and that the *Skins* Corrupting, and Breeding *Wormes*, the *Wormes* do devour the *Pith* and *Marrow* of it, and so make it *Hollow*, but Meddle not with the *Bark*, because to them it is bitter.

622 There were in *Ancient time*, *Vines*, of far greater *Bodies*, then we know any; for there have been *Cups* made of them, and an *Image* of *Jupiter*. But it is like they were *Wild-Vines*; for the *Vines* that they use for *VVine*, are so often

often Cut; and so much Digged and dressed, that their Sap spendeth into the *Grapes*, and so the *Stalk* cannot increase much in *Bulke*. The *Wood* of *Vines* is very durable, without *Rotting*. And that which is strange, though no *Tree* hath the *Twigs*, while they are green, so brittle, yet the *Wood* dried is extreme tough; and was used by the *Captaines* of *Armies* amongst the *Romans* for their *Cudgels*.

It is reported, that in some Places, *Vines* are suffered to grow like *Herbs* spreading upon the *Ground*; and that the *Grapes* of those *Vines* are very great. It were good to make triall, whether *Plants* that use to be born up by props, will put forth greater *Leaves*, and greater *Fruits*, if they be laid along the *Ground*; as *Hops*, *Ivy*, *Woodbine*, &c.

Quinces or *Apples*, &c. If you will keep them long, drown them in *Honey*; But because *Honey* (perhaps) will give them a Taste over-lushious, it were good to make triall in *Powder* of *Sugar*; or in *Syrup* of *Wine* only boyled to Height. Both these would likewise be tried in *Oranges*, *Limmons*, and *Pomegranates*; for the *Powder* of *Sugar*, and *Syrup* of *Wine*, will serve for times more than once.

The *Conservation* of *Fruit* would be also tried in *Vessells*, filled with *Fine Sand* or with *Powder* of *Chalk*; or in *Meal* and *Flower*; or in *Dust* of *Oake wood*; Or in *Mill*.

Such *Fruits* as you appoint for *Long Keeping*, you must gather before they be full *Ripe*; And in a *Fair* and *Drie Day*, towards *Noon*; and when the *Wind* bloweth not *South*: and when the *Moon* is under the *Earth*, and in *Decrease*.

Take *Grapes* and hang them in an *Empty Vessel*, well stopped; and set the *Vessel* not in a *Cellar*, but in some *dry Place*; and it is said, they will last long. But it is reported by some, they will keep better in a *Vessel* half full of *Wine*, so that the *Grapes* touch not the *Wine*.

It is reported, that the *Preserving* of the *Stalk*, helpeth to preserve the *Grapes*; Especially if the *Stalk* be put into the *Pith* of *Elder*, the *Elder* not touching the *Fruit*.

It is reported by some of the *Antients* that *Fruit* put into *Bottles*, and the *Bottles* let down into *Wells* under *Water*, will keep long.

Of *Herbs* and *Plants*, some are good to eat *Raw*; as *Lettuce*, *Endive*, *Furflane*, *Tarragon*, *Cresses*, *Cucumbers*, *Musk-Melons*, *Radish*, &c. Others onely after they are *Boyled*, or have *Passed the Fire*, as *Parsley*, *Clary*, *Sage*, *Parsnips*, *Turnips*, *Asparagus*, *Artichocks*, (though they also being young are eaten *Raw*). But a Number of *Herbs* are not *Esculent* at all: As *Worm-wood*, *Grasse*, *Green-Corn*, *Centory*, *Hyssope*, *Lavender*, *Balm*, &c. The *Causes* are, for that the *Herbs* that are not *Esculent*, do want the two *Tastes*, in which *Nourishment* resteth; Which are *Fat* and *Sweet*; And have (contrarywise) *Bitter* and *Over-strong Tastes*, or a *Juice* so crude, as cannot be ripened to the degree of *Nourishment*, *Herbs*, and *Plants*, that are *Esculent Raw*, have *Fatnesse*, or *Sweetnesse* (as all *Esculent Fruits*;) Such are *Onions*, *Lettuce*, &c. But then it must be such a *Fatnesse*, (for as for *Sweet Things*, they are in effect alwayes *Esculent*) as is not over-grosse, an *Loading* of the *Stomack*; For *Parsnips* and *Leeks* have *Fatnesse*; But it is too *Grosse* and *Heavy* without *Boyling*. It must be also in a *Substance* somewhat *Tender*, For we see *Wheat*, *Barley*, *Artichocks* are no good *Nourishment*, till they have passed the *Fire*; But the *Fire* doth ripen, and maketh them soft and tender, and so they become *Esculent*. As for *Radish*, and *Tarragon*, and the like; they are for *Condiments* and not for *Nourishment*. And even some of those *Herbs*, which are not *Esculent*

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lent, are notwithstanding *Poculent*, As *Hops*, *Broome*, &c. *Quere*, what Herbs are good for *Drink* besides the two aforesamed; For that it may (perhaps) ease the charge of *Brewing*, if they make *Beer* to require lesse *Malt*, or make it last longer.

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Parts fit for the *Nourishment* of *Man* in *Plants*, are *Seeds*, *Roots*, and *Fruits*; But chiefly *Seeds*, and *Roots*. For *Leaves*, they give no *Nourishment* at all, or very little: No more do *Flowers*, or *Blossomes*, or *Stalkes*. The Reason is for that *Roots*, and *Seeds*, and *Fruits*, (inasmuch as all *Plants* consist of an *Oily*, and *Watry Substance* commixed) have more of the *Oily Substance*, and *Leaves*, *Flowers*, &c. of the *Watry*. And secondly they are more *Concocted*; For the *Root*, which continueth ever in the *Earth* is still *concocted* by the *Earth*; And *Fruits*, and *Grains*, (we see) are halfe a year, or more, in *Concocting*; Whereas *Leaves* are out, and *Perfect* in a Month.

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Plants, (for the most part) are more strong, both in *Taste* and *Smell*, in the *Seed*, than in the *Leaf* and *Root*. The Cause is, for that in *Plants* that are not of a *Fierce* and *Eager Spirit*, the *Vertue* is encreased by *Conction*, and *Maturation*, which is ever most in the *Seeds*; But in *Plants* that are of a *Fierce* and *Eager Spirit*, they are stronger whilest the *Spirit* is enclosed in the *Root*; and the *Spirits* do but weaken and dissipate, when they come to the *Air* and *Sun*; As we see in *Onions*, *Garlick*, *Dragon*, &c. Nay there be *Plants* that have their *Roots* very *Hot* and *Aromatical*; And their *Seeds* rather *Inspide* as *Ginger*. The Cause is (as was touched before,) for that the *Heat* of those *Plants* is very *Dissipable*; which under the *Earth* is contained and held in; But when it cometh to the *Air* it exhalet.

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The *Juices* of *Fruits* are either *Watry* or *Oily*. I reckon amongst the *Watry* all the *Fruits* out of which *Drink* is exprest; as the *Grape*, the *Apple*, the *Peer*, the *Cherry*, the *Pomegranate*, &c. And there are some others, which though they be not in use for *Drink*, yet they appear to be of the same *Nature*; as *Plums*, *Services*, *Mulberries*, *Rasps*, *Oranges*, *Limmons*, &c. And for those *Juices*, that are so fleshy, as they cannot make *Drink* by *Expression*, yet (perhaps) they may make *Drink* by mixture of *Water*.

Poculaque admistis imitantur vitea Sorbis.

And it may be *Heps* and *Brier-Berries* would do the like. Those that have *Oily Juices*, are *Olives*, *Almonds*, *Nuts* of all sorts, *Pine-Apples*, &c. And their *Juices*, are all *Inflammable*. And you must observe also, that some of the *Watry Juices*, after they have gathered *Spirit*, will burn and Enflame, As *Wine*. There is a third Kind of *Fruit* that is sweet without either *Sharpnesse*, or *Oyliness*: such as is the *Fig* and the *Date*.

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It hath been noted, that most *Trees*, and especially those that bear *Mast*, are fruitfull but once in two years. The Cause (no doubt) is the *Expence* of *Sap*; For many *Orchard Trees* well Cultured, will bear divers years together.

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There is no *Tree* which besides the *Naturall Fruit*, doth bear so many *Bastard Fruits* as the *Oake* doth; For besides the *Acorne*, it beareth *Galls*, *Oake-Apples*, and certain *Oake-Nuts*, which are *Inflammable*; And certain *Oake-Berries* sticking close to the *Body* of the *Tree* without *Stalk*. It beareth also *Mistletoe*, though rarely. The cause of all these may be, the *Closeness* and *Solidness* of the *Wood*, and *Pithe* of the *Oake*; Which maketh severall *Juices* finde severall *Eruptions*. And therefore if you will devise to make any *Super-Plants*, you must ever give the *Sap* plentifull rising, and *Hard Issue*.

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There are two *Excrefcences*, which grow upon *Trees*; Both of them in the Nature of *Mufbroomes*: The one the *Romans* called *Boletus*; which groweth upon the *Roots* of *Oaks*; and was one of the *Dainties* of their *Table*: The other is *Medicinnall*, that is called *Agarick* (whereof we have fpoken before) which groweth upon the *Tops* of *Oakes*; though it be affirmed by fome, that it groweth alfo at the *Roots*. I do conceive, that many *Excrefcences* of *Trees* grow chiefly, where the *Tree* is dead or faded; for that the *Naturall Sap* of the *Tree* corrupteth into fome *Prenaturall Subftance*.

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The greater part of *Trees* bear *Moft*, and *Beft*, on the *Lower Boughs*; As *Oakes*, *Figs*, *Wall-Nuts*, *Pears*, &c. But fome bear *Beft* on the *Top Boughs*; As *Crabs*, &c. Thofe that bear *beft* below, are fuch, as *shade* doth more good to than hurt. For generally all *Fruits* bear *beft* loweft; Becauſe the *Sap* itreth, not having but a ſhort *Way*: And therefore in *Fruits* ſpread upon *Walls*; the *Loweft* are the *greateſt*, as was formerly ſaid; So it is, the *ſhade* that hindreth the *Lower-Boughs*; Except it be in ſuch *Trees*, as delight in *ſhade*, or at leaſt bear it well. And therefore they are either ſtrong *Trees* as the *Oak*; or elſe they have large *Leaves*, as the *Wall-Nut* and *Fig*; Or elſe they grow in *Pyramis* as the *Pear*. But if they require very much *Sun*, they bear *beft* on the *Top*; as it is *Crabs*, *Apples*, *Plums*, &c.

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There be *Trees* that bear *beft* when they begin to be *Old*; as *Almonds*, *Pears*, *Vines*, and all *Trees* that give *Maſt*. The *Cauſe* is, for that all *Trees* that bear *Maſt* have an *Oily Fruit*; and *Young Trees*, have a more *Vvatry Juyc*, and leſſe *Concocted*; And of the ſame kind alſo is the *Almond*. The *Pear* like- wiſe though it be not *Oily*, yet it requireth much *Sap*, and well concocted; For we ſee it is a heavy *Fruit* and ſolid; much more than *Apples*, *Plums*, &c. As for the *Vine* it is noted that it beareth more *Grapes* when it is *Young*; but *Grapes* that make better *Wine*, when it is *Old*; for that the *Juice* is the better concocted: And we ſee that *VVine* is inflammable; ſo as it hath a kind of *Oylineſſe*. But the moſt part of *Trees*, amongſt which are *Apples*, *Plums*, &c. bear *beft* when they are *Young*.

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There be *Plants*, that have a *Milk* in them, when they are *Cut*; as *Figs*, *Old-Lettuce*, *Sow-Thiſtles*, *Spurge*, &c. The *Cauſe* may be an *Inception* of *Putrefaction*: For thoſe *Milks* have all an *Acrimony*; Though one would think they ſhould be *Lenitive*. For if you write upon *Paper* with the *Milk* of the *Fig*, the *Letters* will not be ſeen, untill you hold the *Paper* before the *Fire*, and then they wax *Brown*; which ſheweth that it is a *Sharp* or *Fretting Juyc*: *Lettuce* is thought *Poyſonous*, when it is ſo *Old* as to have *Milk*; *Spurge* is a kinde of *Poyſon* in it ſelf; and as for *Sow-Thiſtles*, though *Coneys* eat them, yet *Sheep* and *Cattel* will not touch them; and beſides, the *Milk* of them, rubbed upon *Warts*, in ſhort time weareth them away: Which ſheweth the *Milk* of them to be *Corroſive*. We ſee alſo that *Wheat*, and other *Corn*, ſown, if you take them forth of the *Ground*, before they ſprout, are full of *Milk*; and the beginning of *Germination* is ever a kind of *Putrefaction* of the *Seed*. *Euphorbium* alſo hath a *Milk*, though not very white, which is of a great *Acrimony*. And *Saladine* hath a yellow *Milk*, which hath likewiſe much *Acrimony*; for it cleanſeth the *Eyes*. It is good alſo for *Cataracts*.

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Mufbroomes are reported to grow, as well upon the *Bodies* of *Trees*, as upon their *Roots*, or upon the *Earth*: and eſpecially upon the *Oak*. The *Cauſe* is, for that ſtrong *Trees* are towards ſuch *Excefcences*, in the Nature of *Earth*; and therefore put forth *Moſſe*, *Mufbroomes*, and the like,

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There is hardly found a *Plant*, that yieldeth a *Red Juice*, in the *Blade*, or *Ear*, except it be the *Tree*, that beareth *Sanguis Draconis* : Which groweth chiefly in the *Island Soquatra* : The *Herb Aramantus* (indeed) is *Red* all over ; And *Brasil* is *Red* in the *Wood* ; And so is *Red Sanders*. The *Tree* of *Sanguis Draconis*, groweth in the form of a *Sugar Loaf*. It is like, the *Sap* of that *Plant* concocteth in the *Body*, of the *Tree*. For we see, that *Grapes*, and *Pomegranates*, are *Red* in the *Juice*, but are *Green* in the *Tear* : And this maketh the *Tree* of *Sanguis Draconis* lesser towards the *Top*, because the *Juice* hasteneth not up ; and besides, it is very *Astringent* ; and therefore of slow motion.

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It is reported, that *Sweet Mosse*, besides that upon the *Apple Trees*, groweth likewise (sometimes) upon *Poplars* ; and yet (generally) the *Poplar* is a smooth *Tree* of *Bark*, and hath little *Moss*. The *Mosse* of the *Larix-Tree* burneth also sweet, and sparkleth in the burning. *Quere* of the *Mosses* of *Odorate Trees* ; as *Cedar*, *Cypresse*, *Lignum*, *Aloes*, &c.

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The *Death*, that is most without *Pain*, hath been noted to be, upon the *Taking* of the *Potion* of *Hemlock* ; which in *Humanity* was the *Form* of *Execution* of *Capitall Offenders* in *Athens*. The *Poyson* of the *Aspe*, that *Cleopatra* used, hath some affinity with it. The *Cause* is, for that the *Torments* of *Death*, are chiefly raised by the *strife* of the *Spirits* ; and these *Vapours* quench the *Spirits* by *Degrees* ; Like to the *Death* of an extreme *Old Man*. I conceive, it is less *Painfull* then *Opium*, because *Opium* hath *Parts* of *Heat* mixed.

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There be *Fruits*, that are *Sweet* before they *Ripen* ; as *Mirabolanes* ; So *Fennell-Seeds* are *Sweet* before they ripen, and after grow *Spicy*. And some never *Ripen* to be *Sweet* ; As *Tamarinds*, *Barberries*, *Crabs*, *Sloes*, &c. The *Cause* is, for that the former kind have much and subtle *Heat*, which causeth early sweetness ; the latter have a *Cold* and *Acide Juice* ; which no *Heat* of the *Sun* can sweeten. But as for the *Mirabolane*, it hath *Parts* of *Contrary Natures* ; for it is *Sweet* and *Astringent*.

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There be few *Herbs* that have a *Salt Taste* ; And contrariwise, all *Blood* of *Living Creatures*, hath a *Saltneffe* : The *Cause* may be, for that *Salt*, though it be the *Rudiment* of *Life*, yet in *Plants* the *Originall Taste* remaineth not ; For you shall have them *Bitter*, *Sowre*, *Sweet*, *Biting*, but seldom *Salt* : But in *Living Creatures*, all those high *Tastes* may happen to be (sometimes) in the *Humours*, but are seldom in the *Flesh*, or *Substance* ; because it is of a more *Oily Nature*, which is not very susceptible of those *Tastes* ; and the *Saltneffe* it self of *Blood*, is but a light and secret *Saltneffe* : And even among *Plants*, some do participate of *Saltneffe*, as *Alga Marina*, *Samphire*, *Scorvy-Grasse*, &c. And they report, there is, in some of the *Indian Seas*, a *Swimming Plant*, which they call *Salgaxus*, spreading over the *Sea*, in such sort, as one would think it were a *Meadow*. It is certain that out of the *Asbes*, of all *Plants*, they extract a *Salt*, which they use in *Medicines*.

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It is reported, by one of the *Ancients*, that there is an *Herb*, growing in the *Water*, called *Lincostis*, which is full of *Prickles* : This *Herb* putteth forth another small *Herb* out of the *Leaf* ; which is imputed to some *Moisture*, that is gathered between the *Prickles*, which *Putrified* by the *Sun*, *Germi*-*nateth*. But I remember also, I have seen, for a great *Rarity*, one *Rose* grow out of another, like *Honey-Suckles*, that they call *Top* and *Top-gallants*.

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Barley (as appeareth in the *Malting*) being steeped in *Water* three dayes, and afterwards the *Water* drained from it, and the *Barly*, turned upon a drier floor, will sprout, half an *Inch* long at least : And if it be let alone, and

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not turned, much more, until the Heart be out. *Wheat* will doe the same. Try it also with *Pease* and *Beans*. This *Experiment* is not like that of the *Orpin* and *Semper-vive*; for there it is of the old store, for no *Water* is added; but here it is nourished from the *Water*. The *Experiment* would be further driven: For it appeareth already, by that which hath been said, that *Earth* is not necessary to the first sprouting of *Plants*; and we see that *Rose-Buds* set in *Water* will blow: Therefore try whether the *Sprouts* of such *Grains* may not be raised to a further degree, as to an *Herb* or *Flower*, with *Water* onely, or some small commixture of *Earth*: for if they will, it should seem by the *Experiments* before, both of the *Malt* and of the *Roses*, that they will come farre faster on in *Water* then in *Earth*; for the *Nourishment* is easilier drawn out of *Water* then out of *Earth*. It may give some light also, that *Drink* infused with *Flesh*, as that with the *Capon*, &c. will nourish faster and easilier then *Meat* and *Drink* together. Try the same *Experiment* with *Roots*, as well as with *Grains*: As for example, take a *Turnip* and steep it a while, and then dry it, and see whether it will sprout.

Malt in the *Drenching* will swell, and that in such a manner, as after the putting forth in sprouts, and the drying upon the Kiln, there will be gained at least a Bushel in eight, and yet the sprouts are rubbed off; and there will be a Bushel of *Dust* besides the *Malt*: which I suppose to be, not onely by the loose and open laying of the *Parts*, but by some addition of *Substance* drawn from the *Water* in which it was steeped.

Malt gathereth a *Sweetness* to the *Tast*, which appeareth yet more in the *Wort*. The *Dulcoration* of *Things* is worthy to be tried to the full; for that *Dulcoration* importeth a degree to *Nourishment*. And the making of *Things* *Inalimental* to become *Alimental*, may be an *Experiment* of great profit for making new *Vitual*.

Most *Seeds* in the growing leave their *Husk* or *Rind* about the *Root*; but the *Onion* will carry it up, that it will be like a Cap upon the top of the young *Onion*. The *Cause* may be, for that the *Skin* or *Husk* is not easie to break; as we see by the pilling of *Onions*, what a holding *Substance* the *Skin* is.

Plants that have *Curled Leaves* do all abound with *Moisture*, which cometh so fast on, as they cannot spread themselves plain, but must needs gather together. The weakest kind of *Curling* is *Roughness*; as in *Clary* and *Burre*. The second is *Curling* on the sides; as in *Lettuce* and young *Cabbage*. And the third is folding into an *Head*; as in *Cabbage* full grown and *Cabbage Lettuce*.

It is reported that *Firre* and *Pine*, especially if they be *Old* and *Putrefied*, though they shine not as some *Rotten Woods* do, yet in the sudden *Breaking* they will sparkle like hard *Sugar*.

The *Roots* of *Trees* do (some of them) put downwards deep into the *Ground*; as the *Oak*, *Pine*, *Firre*, &c. Some spread more towards the *Surface* of the *Earth*; as the *Ash*, *Cypress-tree*, *Olive*, &c. The *Cause* of this latter may be, for that such *Trees* as love the *Sun* do not willingly descend farre into the *Earth*; and therefore they are (commonly) *Trees* that shoot up much; for in their *Body* their desire of approach to the *Sun* maketh them spread the less. And the same reason, under *Ground*, to avoid recess from the *Sun*, maketh them spread the more. And we see it cometh to pass in some *Trees* which have been planted too deep in the *Ground*, that for love of approach to the *Sun* they forsake their first *Root*, and put out another more towards the *Top* of the *Earth*. And we see also that the *Olive* is full of *Oily Juice*; and *Ash* maketh the best *Fire*; and

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Gypress is an *Hot Tree*. As for the *Oak*, which is of the former sort, it loveth the *Earth*, and therefore groweth slowly. And for the *Pine*, and *Firre* likewise, they have so much *Heat* in themselves, as they need less the *Heat* of the *Sun*. There be *Herbs* also that have the same difference; as the *Herb* they call *Morsus Diaboli*, which putteth the *Root* down so low, as you cannot pull it up without *Breaking*: which gave occasion to the *Name* and *Fable*; for that it was said it was so wholesome a *Root*, that the *Devil* when it was gathered bit it for *Envy*. And some of the *Ancients* do report, that there was a goodly *Firre* (which they desired to remove whole) that had a *Root* under *Ground* eight Cubits deep; and so the *Root* came up broken.

654 It hath been observed, that a *Branch* of a *Tree* being *Unbarked* some space at the *Bottom*, and so set into the *Ground*, hath grown, even of such *Trees*, as if the *Branch* were set with the *Bark* on, they would not grow; yet contrariwise we see, that a *Tree* pared round in the *Body* above *Ground* will die. The *Cause* may be, for that the *Unbarked Part* draweth the nourishment best, but the *Bark* continueth it onely.

655 *Grapes* will continue *Fresh* and *Moist* all *Winter* long, if you hang them *Cluster* by *Cluster* in the *Roof* of a *Warm Room*; especially, if when you gather the *Cluster* you take off with the *Cluster* some of the *Stock*.

656 The *Reed* or *Cane* is a *Watry Plant*, and groweth not but in the *Water*. It hath these properties; That it is *Hollow*; that it is *Knuckled*, both *Stalk* and *Root*; that being *Dry* it is more *Hard* and *Fragile* then other *Wood*; that it putteth forth no *Boughs*, though many *Stalks* out of one *Root*. It differeth much in greatness; the smallest being fit for *Thatching* of *Houses*, and stopping the chinks of *Ships* better then *Glew* or *Pitch*. The second bigness is used for *Angle-rods* and *Staves*; and in *China* for beating of *Offenders* upon the *Thighs*. The differing *Kinds* of them are, The *Common Reed*, the *Cassia Fistula*, and the *Sugar-Reed*. Of all *Plants* it boweth the easiest, and riseth again. It seemeth, that amongst *Plants* which are nourished with *Mixture* of *Earth* and *Water*, it draweth most nourishment from *Water*; which maketh it the *Smoothest* of all others in *Bark*, and the *Hollowest* in *Body*.

657 The *Sap* of *Trees*, when they are let *Bloud*, is of differing *Natures*. Some more *Watry* and *Clear*; as that of *Vines*, of *Beeches*, of *Pears*: some *Thick*, as *Apples*: some *Gummy*, as *Cherries*; some *Frothy*, as *Elms*; some *Milky*, as *Figs*. In *Mulberries*, the *Sap* seemeth to be (almost) towards the *Bark* onely: for if you cut the *Tree* a little into the *Bark* with a *Stone*, it will come forth; if you pierce it deeper with a *Tool*, it will be dry. The *Trees* which have the *Moistest Juices* in their *Fruit*, have commonly the *Moistest Sap* in their *Body*: for the *Vines* and *Pears* are very *Moist*; *Apples* somewhat more *Sponie*: The *Milk* of the *Figge* hath the quality of the *Rennet*, to gather *Cheese*; and so have certain *Sour Herbs* wherewith they make *Cheese* in *Lent*.

658 The *Timber* and *Wood* are in some *Trees* more *Clean*, in some more *Knotty*; and it is a good trial, to try it by speaking at one end, and laying the *Ear* at the other: For if it be *Knotty*, the *Voice* will not pass well. Some have the *Veins* more varied and *Chamloted*; As *Oak*, whereof *Wainscot* is made; *Maple*, whereof *Trenchers* are made: Some more smooth, as *Firre* and *Wall-nut*: Some do more easily breed *Worms* and *Spiders*; some more hardly, as it is said of *Irish Trees*. Besides, there be a number of differences that concern their *Use*: As *Oak*, *Cedar* and *Chest-nut* are the

the best Builders. Some are best for *Plough-timber*, as *Ash*; some for *Peers*; that are sometimes wet and sometimes dry, as *Elme*; some for *Planchers*, as *Deal*; some for *Tables*, *Cup-boards* and *Desks*, as *Wall-nuts*; some for *Ship-timber*, as *Oaks* that grow in *Moist Grounds*, (for that maketh the *Timber* tough, and not apt to rift with *Ordnance*, wherein *English* and *Irish Timber* are thought to excel) some for *Masts of Ships*, as *Firre* and *Pine*, because of their length, straightness and lightness; some for *Pale*, as *Oak*; some for *Fucll*, as *Ash*: and so of the rest.

The *Coming* of *Trees* and *Plants* in certain *Regions*, and not in others, is sometimes *Casual*: for many have been translated, and have prospered well; as *Damask Roses*, that have not been known in *England* above an hundred years, and now are so common. But the liking of *Plants* in certain *Soils* more then in others, is merely *Natural*: As the *Firre* and *Pine* love the *Mountains*; the *Poplar*, *Willow*, *Sallow*, and *Alder*, love *Rivers* and *Moist Places*; the *Ash* loveth *Coppices*, but is best in *Standards* alone; *Juniper* loveth *Chalk*, and so do most *Fruit-trees*; *Sampire* groweth but upon *Rocks*; *Reeds* and *Osfers* grow where they are washed with *Winter*; the *Vine* loveth sides of *Hills* turning upon the *South-East Sun*, &c.

The *Putting forth* of certain *Herbs* discovereth of what *Nature* the *Ground* where they put forth is: as *Wilde Thyme* sheweth good *Feeding-Ground* for *Cattel*; *Betony* and *Strawberries* shew *Grounds* fit for *Wood*; *Camomile* sheweth mellow *Grounds* fit for *Wheat*; *Mustard-seed* growing after the *Plough*, sheweth a good *strong Ground* also for *Wheat*; *Burnet* sheweth good *Meadow*: and the like.

There are found in divers *Countries* some other *Plants* that grow out of *Trees* and *Plants*, besides *Missel-toe*: As in *Syria* there is an *Herb* called *Cassias*, that groweth out of tall *Trees*, and windeth it self about the same *Tree* where it groweth, and sometimes about *Thorns*. There is a kinde of *Polypode* that groweth out of *Trees*, though it windeth not. So likewise an *Herb* called *Fannos* upon the *Wilde Olive*: and an *Herb* called *Hippophastron* upon the *Fullers Thorn*, which, they say, is good for the *Falling-Sickness*.

It hath been observed by some of the *Ancients*, that howsoever *Cold* and *Easterly Winds* are thought to be great *Enemies* to *Fruit*; yet nevertheless *South-winds* are also found to doe hurt, especially in the *Blossoming-time*; and the more, if *Showrs* follow. It seemeth they call forth the *Moisture* too fast. The *West-winds* are the best. It hath been observed also, that *Green* and *Open Winters* doe hurt *Trees*; insomuch as if two or three such *Winters* come together, *Almond-Trees* and some other *Trees* will die. The *Cause* is the same with the former, because the *Lust* of the *Earth* over-spendeth it self; howsoever some other of the *Ancients* have commended *Warm Winters*.

Snows lying long cause a *Fruitful Year*. For first, they keep in the *Strength* of the *Earth*: secondly, they water the *Earth* better then *Rain*; for in *Snow* the *Earth* doth (as it were) suck the *Water* as out of the *Teat*: Thirdly, the *Moisture* of *Snow* is the finest *Moisture*; for it is the *Frost* of the *Cloudy Waters*.

Showrs, if they come a little before the *Ripening* of *Fruits*, doe good to all *Succulent* and *Moist Fruits*; as *Vines*, *Olives*, *Pomegranates*: yet it is rather for *Plenty* then for *Goodness*; for the best *Wines* are in the driest *Vintages*. *Small Showers* are likewise good for *Corn*, so as *Parching Heats* come not upon them. Generally, *Night-Showers* are better then *Day*.

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Showers; for that the *Sun* followeth not so fast upon them: and we see, even in *Watering* by the *Hand*, it is best in *Summer-time* to water in the *Evening*.

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The *Differences* of *Earths*, and the *Trials* of them, are worthy to be diligently enquired. The *Earth* that with *Showers* doth easily *Soften*, is commended: And yet some *Earth* of that kinde will be very *Dry* and *Hard* before the *Showers*. The *Earth* that casteth up from the *Plough* a great *Clod*, is not so good as that which casteth up a smaller *Clod*. The *Earth* that putteth forth *Moss* easily, and may be called *Mouldy*, is not good. The *Earth* that smelleth well upon the *Digging*, or *Ploughing*, is commended; as containing the *Juice* of *Vegetables* almost already prepared. It is thought by some, that the *Ends* of low *Rain-bows* fall more upon one kinde of *Earth* then upon another: As it may well be, for that *Earth* is most *Rosside*; and therefore it is commended for a *Sign* of good *Earth*. The *Poorneß* of the *Herbs* (it is plain) sheweth the *Poorneß* of the *Earth*; and especially if they be in *Colour* more dark: But if the *Herbs* shew *Withered* or *Blasted* at the *Top*, it sheweth the *Earth* to be very *Cold*: And so doth the *Mossiness* of *Trees*. The *Earth* whereof the *Grass* is soon *Parched* with the *Sun*, and *Toasted*, is commonly *Forced Earth*, and *Barren* in his own *Nature*. The *Tender*, *Chessome*, and *Mellow Earth* is the best; being mere *Mould*, between the two *Extremes* of *Clay* and *Sand*; especially if it be not *Loamy* and *Binding*. The *Earth* that after *Rain* will scarce be *Ploughed*, is commonly *Fruitful*; for it is *Cleaving*, and full of *Juice*.

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It is strange, which is observed by some of the *Ancients*, that *Dust* helpeth the *Fruitfulness* of *Trees*, and of *Vines* by name; insomuch as they cast *Dust* upon them of purpose. It should seem that that *Powdring*, when a *Shower* cometh, maketh a kinde of *Soiling* to the *Tree*, being *Earth* and *Water* finely laid on. And they note, that *Countries* where the *Fields* and *Waies* are *Dusty*, bear the best *Vines*.

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It is commended by the *Ancients* for an *Excellent Help* to *Trees*, to lay the *Stalks* and *Leaves* of *Lupines* about the *Roots*; or to *Plough* them into the *Ground*, where you will sow *Corn*. The *Burning* also of the *Cuttings* of *Vines*, and *Casting* them upon *Land*, doth much good. And it was generally received of old, that *Dunging* of *Grounds* when the *West-winde* bloweth, and in the *Decrease* of the *Moon*, doth greatly help; the *Earth* (as it seemeth) being then more thirsty, and open to receive the *Dung*.

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The *Grafting* of *Vines* upon *Vines* (as I take it) is not now in use: The *Ancients* had it, and that three waies. The first was *Inſition*, which is the *Ordinary manner* of *Grafting*: The second was *Terebration*, through the *Middle* of the *Stock*, and putting in the *Cions* there: And the third was *Paring* of two *Vines* that grow together, to the *Marrow*, and *Binding* them close.

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The *Diseases*, and ill *Accidents* of *Corn* are worthy to be enquired; and would be more worthy to be enquired, if it were in *Mens Power* to help them; whereas many of them are not to be remedied. The *Milk-dew* is one of the greatest; which (out of question) cometh by *Cloſeneß* of *Air*; and therefore in *Hills*, or large *Champaign Grounds*, it ſeldome cometh; ſuch as is with us *York's Wold*. This cannot be remedied, otherwise then that in *Countries* of ſmall *Encloſure* the *Grounds* be turned into larger *Fields*: Which I have known to doe good in ſome *Farms*. Another *Disease* is the *Eutting forth* of *Wilde Oats*, whereinto *Corn* oftentimes (eſpecially *Barley*) doth degenerate. It happeneth chiefly from the

the *Weakness* of the *Grain* that is sown; for if it be either too old or mouldy, it will bring forth *Wild Oats*. Another *Disease* is the *Satiety* of the *Ground*: for if you sow one *Ground* still with the same *Corn* (I mean not the same *Corn* that grew upon the same *Ground*, but the same *Kinde* of *Grain*, as *Wheat*, *Barley*, &c.) it will prosper but poorly: therefore besides the *Resting* of the *Ground*, you must vary the *Seed*. Another ill *Accident* is from the *Winds*, which hurt at two times; at the *Flowring*, by *Shaking* off the *Flowers*, and at the full *Ripening*, by *Shaking* out the *Corn*. Another ill *Accident* is *Drought* at the *Spindling* of the *Corn*; which with us is rare, but in hotter *Countries* common; inasmuch as the word *Calamitas* was first derived from *Calamus*, when the *Corn* could not get out of the *Stalk*. Another ill *Accident* is *Over-wet* at *Sowing-time*; which with us breedeth much *Dearth*, inasmuch as the *Corn* never cometh up; and (many times) they are forced to re-sow *Summer-corn* where they sowed *Winter-corn*. Another ill *Accident* is *Bitter Frosts*, continued without *Snow*, especially in the beginning of the *Winter*, after the *Seed* is new sown. Another *Disease* is *Worms*, which sometimes breed in the *Root*, and happen upon *Hot Suns* and *Showers* immediately after the *Sowing*; and another *Worm* breedeth in the *Ear* it self, especially when *Hot Suns* break often out of *Clouds*. Another *Disease* is *Weeds*: and they are such as either choak and over-shadow the *Corn*, and bear it down; or starve the *Corn*, and deceive it of nourishment. Another *Disease* is *Over-rankness* of the *Corn*; which they use to remedy by *Mowing* it after it is come up, or putting *Sheep* into it. Another ill *Accident* is *Laying* of *Corn* with great *Rains*, near or in *Harvest*. Another ill *Accident* is, if the *Seed* happen to have touched *Oil*, or any thing that is *Fat*; for those *Substances* have an *Antipathy* with *Nourishment* of *Water*.

The *Remedies* of the *Diseases* of *Corn* have been observed as followeth. The *Steeping* of the *Grain* before *Sowing* a little time in *Wine*; is thought a *Preservative*: The *Mingling* of *Seed-corn* with *Ashes* is thought to be good. The *Sowing* at the *Wane* of the *Moon* is thought to make the *Corn* sound. It hath not been practised, but it is thought to be of use, to make some *Misellane* in *Corn*; as if you sow a few *Beans* with *Wheat*, your *Wheat* will be the better. It hath been observed, that the *Sowing* of *Corn* with *Houset-leek* doth good. Though *Grain* that toucheth *Oil* or *Fat* receiveth hurt, yet the *Steeping* of it in the *Dregs* of *Oil*, when it beginneth to putrefie, (which they call *Amurca*) is thought to assure it against *Worms*. It is reported also, that if *Corn* be *Mowed*, it will make the *Grain* longer, but emptier, and having more of the *Husk*.

It hath been noted that *Seed* of a year old is the best, and of two or three years is worse; and that which is more old is quite barren: though (no doubt) some *Seed* and *Grain* last better then others. The *Corn* which in the *Vanning* lieth lowest is the best; and the *Corn* which broken or bitten retaineth a little *Yellowness*, is better then that which is very *White*.

It hath been observed, that of all *Roots* of *Herbs* the *Root* of *Spyrel* goeth the furthest into the *Earth*, inasmuch as it hath been known to goe three Cubits deep; and that it is the *Root* that continueth lie (longest) to be set again, of any *Root* that groweth. It is a *Cold* and *Acide Herb*, that (as it seemeth) loveth the *Earth*, and is not much drawn by the *Sun*.

It hath been observed, that some *Herbs* like best being watered with *Salt-water*; as *Radish*, *Beet*, *Rue*, *Penny-royal*. This trial would be extended

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to some other *Herbs*; especially such as are Strong, as *Tarragon*, *Mustard-seed*, *Rocket*, and the like.

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It is strange, that it is generally received, how some *Poisonous Beasts* affect *Odorate* and *Wholsome Herbs*; As that the *Snake* loveth *Fennel*; that the *Toad* will be much under *Sage*; that *Frogs* will be in *Cinquefoile*. It may be it is rather the *Shade*, or other *Coverture*, that they take liking in, then the *Virtue* of the *Herb*.

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It were a matter of great Profit, (save that I doubt it is too Conjectural to venture upon,) if one could discern what *Corn*, *Herbs*, or *Fruits*, are like to be in *Plenty*, or *Scarcity*, by some *Signs* and *Prognosticks*, in the Beginning of the Year: For as for those that are like to be in *Plenty*, they may be bargained for upon the *Ground*: As the Old Relation was of *Thales*; who to shew how easie it was for a *Philosopher* to be rich, when he fore-saw a great *Plenty* of *Olives*, made a *Monopoly* of them. And for *Scarcity*, Men may make Profit in keeping better the Old Store. Long Continuance of *Snow* is believed to make a *Fruitful Year* of *Corn*: An *Early Winter* or a very *Late Winter*, a *Barren Year* of *Corn*: An *Open* and *Serene Winter*, an ill Year of *Fruit*. These we have partly touched before: But other *Prognosticks* of like Nature are diligently to be enquired.

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There seem to be in some *Plants Singularities*, wherein they differ from all Other. The *Olive* hath the *Oily Part* onely on the *Out-side*; whereas all other *Fruits* have it in the *Nut* or *Kernel*. The *Firre* hath (in effect) no *Stone*, *Nut*, nor *Kernel*; except you will count the little *Grains*, *Kernels*. The *Pomegranate* and *Pine-Apple* have onely, amongst *Fruits*, *Grains* distinct in severall *Cels*. No *Herbs* have *Curled Leaves*, but *Cabbage* and *Cabbage-Lettuce*. None have double *Leaves*, one belonging to the *Stalk*, another to the *Fruit* or *Seed*, but the *Artichoke*. No *Flower* hath that kind of Spread that the *Woad-bine* hath. This may be a large Field of Contemplation. For it sheweth that in the Frame of *Nature* there is, in the Producing of some *Species*, a Composition of Matter, which happeneth oft, and may be much diversified: in others, such as happeneth rarely, and admitteth little Variety: For so it is likewise in *Beasts*; *Dogs* have a resemblance with *Wolves* and *Foxes*, *Horses* with *Asses*, *Kine* with *Buffes*, *Hares* with *Coneys*, &c. And so in *Birds*: *Kites* and *Nestrels* have a resemblance with *Hawks*; *Common Doves* with *Ring-Doves*, and *Turtles*; *Black-Birds* with *Thrushes*, and *Mavisses*; *Crows* with *Ravens*, *Daws*, and *Choughs*, &c. But *Elephants* and *Swine* amongst *Beasts*, and the *Bird of Paradise* and the *Peacock* amongst *Birds*, and some few others, have scarce any other *Species* that have Affinity with them.

We leave the Description of *Plants* and their *Virtues* to *Herbals*, and other like *Books* of *Natural History*; wherein *Mens Diligence* hath been great, even to *Curiosity*: For our *Experiments* are onely such, as do ever ascend a Degree to the Deriving of *Causes*, and *Extracting* of *Axiomes*, which we are not ignorant but that some, both of the *Ancient* and *Modern Writers*, have also laboured; but their *Causes* and *Axiomes* are so full of *Imagination*, and so infected with the old Received *Theories*, as they are mere *Inquinations* of *Experience*, and Concoct it not.

IT hath been observed by some of the *Ancients*, that *Skins*, especially of *Rams* newly pulled off, and applied to the *Wounds* of *Stripes*, do keep them from Swelling and Exulcerating; and likewise Heal them, and Close them up: And that the *Whites* of *Eggs* doe the same. The *Cause* is, a Temperate *Conglutination*; for both *Bodies* are Clammy and Viscous, and do bridle the *Deflux* of *Humours* to the Hurts, without penning them in too much.

Experiment
Solitary tou-
ching Healing
of Wounds.

677

YOU may turn (almost) all *Flesh* into a *Fatty Substance*, if you take *Flesh*, and cut it into Pieces, and put the Pieces into a *Glass* covered with Parchment, and so let the *Glass* stand six or seven Hours in *Boiling Water*. It may be an *Experiment* of Profit, for making of *Fat* or *Grease* for many uses: But then it must be of such *Flesh* as is not Edible; as *Horses*, *Dogs*, *Bears*, *Foxes*, *Badgers*, &c.

Experiment
Solitary tou-
ching Fat dis-
solved in Flesh.

678

IT is reported by one of the *Ancients*, that *New Wine* put into *Vessels* well stopped, and the *Vessels* let down into the *Sea*, will accelerate very much the making of them Ripe and Potable. The same would be tried in *Wort*.

Experiment
Solitary tou-
ching Ripening
of Wine before
the Time

679

BEASTS are more *Hairy* than *Men*; and *Savage Men* more than *Civil*: and the *Plumage* of *Birds* exceedeth the *Pilosity* of *Beasts*. The *Cause* of the Smoothness in *Men*, is not any Abundance of *Heat* and *Moisture*, though that indeed causeth *Pilosity*; but there is requisite to *Pilosity*, not so much *Heat* and *Moisture*, as *Excrementitious Heat* and *Moisture*: (For whatsoever assimilath goeth not into the *Hair*) And *Excrementitious Moisture* aboundeth most in *Beasts*, and *Men* that are more *Savage*. Much the same Reason is there of the *Plumage* of *Birds*; For *Birds* assimilate less, and excern more than *Beasts*, for their *Excrements* are ever liquid, and their *Flesh* (generally) more dry: Beside, they have not *Instruments* for *Urine*, and so all the *Excrementitious Moisture* goeth into the *Feathers*: And therefore it is no marvel though *Birds* be commonly better Meat than *Beasts*, because their *Flesh* doth assimilate more finely, and se-cerneth more subtilly. Again, the *Head* of *Man* hath *Hair* upon the first Birth, which no other Part of the *Body* hath. The *Cause* may be *Want* of *Perspiration*: For much of the Matter of *Hair*, in the other Parts of the *Body*, goeth forth by *Insensible Perspiration*. And besides, the *Skull* being of a more solid Substance, nourisheth and assimilath less, and excerneth more: and so likewise doth the *Chin*. We see also that *Hair* cometh not upon the *Palms* of the *Hands*, nor *Soles* of the *Feet*; which are Parts more *Perspirable*. And *Children* likewise are not *Hairy*, for that their *Skins* are more *Perspirable*.

Experiment
Solitary tou-
ching Pilosity
and Plumage.

680

BIRDS are of *Swifter Motion* than *Beasts*: For the *Flight* of many *Birds* is *Swifter* than the *Race* of any *Beasts*. The *Cause* is, for that the *Spirits* in *Birds* are in greater Proportion, in comparison of the Bulk of their *Body*, than in *Beasts*. For as for the Reason that some give, that they are partly Carried, whereas *Beasts* Go, that is Nothing, for by that Reason *Swimming* should be swifter than *Running*: And that Kind of *Carriage* also is not without Labour of the *Wing*.

Experiment
Solitary tou-
ching the
Quickness of
Motion in
Birds.

681

THE *Sea* is *Clearer* when the *North-Wind* bloweth, than when the *South-Wind*. The *Cause* is, for that *Salt-Water* hath a little *Oiliness* in the *Surface* thereof, as appeareth in very Hot *Dares*: And again, for that the

Experiment
Solitary tou-
ching the dif-
ferent Clear-
ness of the Sea.

682

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There seem to be in some *Plants Singularities*, wherein they differ from all Other: The *Olive* hath the *Oily Part* onely on the *Out-side*; whereas all other *Fruits* have it in the *Nut* or *Kernel*. The *Firre* hath (in effect) no *Stone*, *Nut*, nor *Kernel*, except you will count the little *Grains*, *Kernels*. The *Pomegranate* and *Pine-Apple* have onely, amongst *Fruits*, *Grains* distinct in several *Cels*. No *Herbs* have *Curled Leaves*, but *Cabbage* and *Cabbage-Lettuce*. None have double *Leaves*, one belonging to the *Stalk*, another to the *Fruit* or *Seed*, but the *Artichoke*. No *Flower* hath that kind of Spread that the *Wood-bine* hath. This may be a large Field of Contemplation. For it sheweth that in the Frame of *Nature* there is, in the Producing of some *Species*, a Composition of Matter, which happeneth oft, and may be much diversified: in others, such as happeneth rarely, and admitteth little Variety: For so it is likewise in *Beasts*; *Dogs* have a resemblance with *Wolves* and *Foxes*, *Horses* with *Asses*, *Kine* with *Buffes*, *Hares* with *Coneys*, &c. And so in *Birds*: *Kites* and *Nestrels* have a resemblance with *Hawks*; *Common Doves* with *Ring-Doves*, and *Turtles*; *Black-Birds* with *Thrushes*, and *Mavisses*; *Crows* with *Ravens*, *Daws*, and *Choughs*, &c. But *Elephants* and *Swine* amongst *Beasts*, and the *Bird* of *Paradise* and the *Peacock* amongst *Birds*, and some few others, have scarce any other *Species* that have Affinity with them.

We leave the Description of *Plants* and their *Virtues* to *Herbals*, and other like *Books of Natural History*; wherein *Mens Diligence* hath been great, even to *Curiosity*: For our *Experiments* are onely such, as do ever ascend a Degree to the Derriving of *Causes*, and *Extracting* of *Axiomes*, which we are not ignorant but that some, both of the *Ancient* and *Modern Writers*, have also laboured; but their *Causes* and *Axiomes* are so full of *Imagination*, and so infected with the old Received *Theories*, as they are mere *Inquinations* of *Experience*, and *Concoct* it not.

IT hath been observed by some of the *Ancients*, that *Skins*, especially of *Rams* newly pulled off, and applied to the *Wounds* of *Stripes*, do keep them from Swelling and Exulcerating; and likewise Heal them, and Close them up: And that the *Whites* of *Egges* doe the same. The *Cause* is, a Temperate *Conglutination*; for both *Bodies* are Clammy and Viscous, and do bridle the *Deflux* of *Humours* to the Hurts, without penning them in too much.

Experiment
Solitary tou-
ching Healing
of Wounds.
677

YOU may turn (almost) all *Flesh* into a *Fatty Substance*, if you take *Flesh*, and cut it into Pieces, and put the Pieces into a *Glass* covered with Parchment, and so let the *Glass* stand six or seven Hours in *Boiling Water*. It may be an *Experiment* of Profit, for making of *Fat* or *Grease* for many uses: But then it must be of such *Flesh* as is not Edible; as *Horses*, *Dogs*, *Bears*, *Foxes*, *Badgers*, &c.

Experiment
Solitary tou-
ching Fat dis-
solved in Fleth.
678

IT is reported by one of the *Ancients*, that *New Wine* put into *Vessels* well stopped, and the *Vessels* let down into the *Sea*, will accelerate very much the making of them Ripe and Potable. The same would be tried in *Wort*.

Experiment
Solitary tou-
ching Ripening
of Wine before
the Time
679

BEASTS are more *Hairy* then *Men*; and *Savage Men* more then *Civil*: And the *Plumage* of *Birds* exceedeth the *Pilosity* of *Beasts*. The *Cause* of the Smoothness in *Men*, is not any Abundance of *Heat* and *Moisture*, though that indeed causeth *Pilosity*; but there is requisite to *Pilosity*, not so much *Heat* and *Moisture*, as *Excrementitious Heat* and *Moisture*: (For whatsoever assimilath goeth not into the *Hair*) And *Excrementitious Moisture* aboundeth most in *Beasts*, and *Men* that are more *Savage*. Much the same Reason is there of the *Plumage* of *Birds*; For *Birds* assimilate less, and excern more then *Beasts*, for their *Excrements* are ever liquid, and their *Flesh* (generally) more dry: Beside, they have not *Instruments* for *Urine*, and so all the *Excrementitious Moisture* goeth into the *Feathers*: And therefore it is no marvel though *Birds* be commonly better Meat then *Beasts*, because their *Flesh* doth assimilate more finely, and se-cerneth more subtilly. Again, the *Head* of *Man* hath *Hair* upon the first Birth, which no other Part of the *Body* hath. The *Cause* may be Want of *Perspiration*: For much of the Matter of *Hair*, in the other Parts of the *Body*, goeth forth by *Insensible Perspiration*. And besides, the *Skull* being of a more solid substance, nourisheth and assimilath less, and excerneth more: and so likewise doth the *Chin*. We see also that *Hair* cometh not upon the *Palms* of the *Hands*, nor *Soles* of the *Feet*; which are Parts more *Perspirable*. And *Children* likewise are not *Hairy*, for that their *Skins* are more *Perspirable*.

Experiment
Solitary tou-
ching Pilosity
and Plumage.
680

BIRDS are of *Swifter Motion* then *Beasts*: For the *Flight* of many *Birds* is *Swifter* then the *Race* of any *Beasts*. The *Cause* is, for that the *Spirits* in *Birds* are in greater Proportion, in comparison of the Bulk of their *Body*, then in *Beasts*. For as for the Reason that some give, that they are partly Carried, whereas *Beasts* Go, that is Nothing, for by that Reason *Swimming* should be swifter then *Running*: And that Kind of *Carriage* also is not without Labour of the *Wing*.

Experiment
Solitary tou-
ching the
Quickness of
Motion in
Birds.
681

THE *Sea* is *Clearer* when the *North-Wind* bloweth, then when the *South-Wind*. The *Cause* is, for that *Salt-Water* hath a little *Oilliness* in the *Surface* thereof, as appeareth in very Hot *Dates*: And again, for that the

Experiment
Solitary tou-
ching the dis-
ferent Clear-
ness of the Sea.
682

Southern wind relaxeth the *Water* somewhat; as no *Water Boiling* is so clear as *Cold Water*.

Experiment
Solitary touch-
ing the dif-
ferent *Heats*, of
Fire and *Boil-
ing Water*.
683

Fire burneth *Wood*, making it first *Luminous*, then *Black* and *Brittle*, and lastly, *Broken* and *Incinerate*: *Scalding Water* doth none of these. The *Cause* is, for that by *Fire* the *Spirit* of the *Body* is first *Refined*, and then *Emitted*: whereof the *Refining* or *Attenuation* causeth the *Light*; and the *Emission*, first the *Fragility*, and after the *Dissolution* into *Ashes*; neither doth any other *Body* enter. But in *Water* the *Spirit* of the *Body* is not *Refined* so much; and besides, part of the *Water* entreth, which doth increase the *Spirit*, and in a degree extinguish it: therefore we see that *Hot Water* will quench *Fire*. And again, we see that in *Bodies* wherein the *Water* doth not much enter, but only the *Heat* passeth, *Hot Water* worketh the effects of *Fire*: As in *Eggs Boiled* and *Roasted*, (into which the *Water* entreth not at all) there is scarce difference to be discerned; but in *Fruit* and *Flesh*, whereinto the *Water* entreth in some part, there is much more difference.

Experiment
Solitary touch-
ing the
Qualification
of *Heat* by
Moisture.
684

THE *Bottom* of a *Vessel* of *Boiling Water* (as hath been observed) is not very much *Heated*, so as men may put their hand under the *Vessel*, and remove it. The *Cause* is, for that the *Moisture* of *Water*, as it quencheth *Coals* where it entreth, so it doth allay *Heat* where it toucheth. And therefore note well, that *Moisture*, although it doth not pass through *Bodies* without *Communication* of some *Substance* (as *Heat* and *Cold* do,) yet it worketh manifest effects; not by entrance of the *Body*, but by qualifying of the *Heat* and *Cold*; as we see in this *Instance*. And we see likewise, that the *Water* of *Things distilled* in *Water*, (which they call the *Bath*) differeth not much from the *Water* of *Things distilled* by *Fire*. We see also, that *Pewter-Dishes* with *Water* in them will not melt easily, but without it they will. Nay, we see more, that *Butter* or *Oil*, which in themselves are inflammable, yet by the virtue of their *Moisture* will doe the like.

Experiment
Solitary touch-
ing *Yawning*.
685

IT hath been noted by the *Ancients*, that it is dangerous to pick ones *Ear* whilst he *Yawneth*. The *Cause* is, for that in *Yawning* the inner *Parchment* of the *Ear* is extended by the *Drawing* in of the *Spirit* and *Breath*: for in *Yawning* and *Sighing* both, the *Spirit* is first strongly drawn in, and then strongly expelled.

Experiment
Solitary touch-
ing the *Hic-
cough*.
686

IT hath been observed by the *Ancients*, that *Sneezing* doth cease the *Hic-cough*. The *Cause* is, for that the *Motion* of the *Hic-cough* is a *lifting up* of the *Stomach*, which *Sneezing* doth somewhat depress, and divert the *Motion* another way. For first we see that the *Hic-cough* cometh of *Fulness* of *Meat*, (especially in *Children*) which causeth an extension of the *Stomach*: We see also it is caused by *Acide Meats* or *Drinks*, which is by the *Pricking* of the *Stomach*. And this *Motion* is ceased either by *Diversion*, or by *Detention* of the *Spirits*: *Diversion*, as in *Sneezing*; *Detention*, as we see *Holding* of the *Breath* doth help somewhat to cease the *Hic-cough*; and putting a man into an earnest study doth the like, as is commonly used: And *Vinegar* put to the *Nostrils* or *Gargarized* doth it also; for that it is *Astringent*, and inhibiteth the *Motion* of the *Spirit*.

Experiment
Solitary touch-
ing *sneezing*.
687

Looking against the *Sun* doth induce *Sneezing*. The *Cause* is, not the *Heating* of the *Nostrils*; for then the holding up of the *Nostrils* against the

the *Sun*, though one *Wink*, would doe it, but the *Drawing* down of the *Moisture* of the *Brain*: For it will make the *Eies* run with *Water*; and the *Drawing* of *Moisture* to the *Eies*, doth draw it to the *Nostrils* by *Motion* of *Consent*; and so followeth *Sneezing*. As contrariwise, the *Tickling* of the *Nostrils* within doth draw the *Moisture* to the *Nostrils*, and to the *Eies* by *Consent*; for they also will *Water*. But yet it hath been observed, that if one be about to *Sneeze*, the *Rubbing* of the *Eies* till they run with *Water* will prevent it. Whereof the *Cause* is, for that the *Humour*, which was descending to the *Nostrils*, is diverted to the *Eies*.

THE *Teeth* are more by *Cold drink*, or the like, affected, then the other *Parts*. The *Cause* is double. The *One*, for that the *Resistance* of *Bone* to *Cold* is greater then of *Flesh*; for that the *Flesh* shrinketh, but the *Bone* resisteth, whereby the *Cold* becometh more eager. The *Other* is, for that the *Teeth* are *Parts* without *Blond*; whereas *Blond* helpeth to qualifie the *Cold*: And therefore we see that the *Sinews* are much affected with *Cold*; for that they are *Parts* without *Blond*. So the *Bones* in sharp *Colds* wax *Brittle*; and therefore it hath been seen, that all *Contusions* of *Bones* in *Hard Weather* are more difficult to Cure.

Experiment
Solitary touching the
Tenderness of
the Teeth.
688

IT hath been noted, that the *Tongue* receiveth more easily *Tokens* of *Diseases* then the other *Parts*; as of *Heats* within, which appear most in the *Blackness* of the *Tongue*. Again, *Pied Cattel* are spotted in their *Tongues*, &c. The *Cause* is (no doubt) the *Tenderness* of the *Part*, which thereby receiveth more easily all *Alterations* then any other *Parts* of the *Flesh*.

Experiment
Solitary touching the
Tongue.
689

WHEN the *Mouth* is out of *Fast*, it maketh things tast sometimes *Salt*, chiefly *Bitter*, and sometimes *Loathsome*; but never *Sweet*. The *Cause* is, the *Corrupting* of the *Moisture* about the *Tongue*, which many times turneth *Bitter*, and *Salt*, and *Loathsome*; but *Sweet* never; For the rest are *Degrees* of *Corruption*.

Experiment
Solitary touching the
Taste.
690

IT was observed in the *Great Plague* of the last Year, that there were seen in divers *Ditches*, and low grounds about *London*, many *Toads* that had *Tails*, two or three Inches long at the least; whereas *Toads* (usually) have no *Tails* at all: Which argueth a great *Disposition* to *Putrefaction* in the *Soil* and *Air*. It is reported likewise that *Roots* (such as *Carrots* and *Parsnips*) are more *Sweet* and *Luscious* in infectious Years then in other Years.

Experiment
Solitary touching some
Prognosticks
of Pestilential
Seasons.
691

WISE *Physicians* should with all diligence inquire what *Simples* Nature yieldeth, that have extream *Subtile Parts* without any *Mordication* or *Acrimony*: for they undermine that which is *Hard*, they open that which is *Stopped* and *Shut*, and they expell that which is *Offensive* gently, without too much *Perturbation*. Of this kinde are *Bilder Flowers*, which therefore are proper for the *Stone*: Of this kinde is the *Dwarf's Pine*, which is proper for the *Faundies*: Of this kinde is *Hares Horn*, which is proper for *Aguis* and *Infections*: Of this kinde is *Piony*, which is proper for *Stoppings* in the *Head*: Of this kinde is *Rumitory*, which is proper for the *Spleen*; and a number of others. Generally, divers *Creatures* bred of *Putrefaction*, though they be somewhat loathsome to take, are of this kinde, as *Earth-Worms*, *Timber-Sows*, *Snails*, &c. And I conceive that the *Trachises* of *Fishers*, (which are so much magnified) and the *Flesh* of *Snakes* some waxes con-

Experiment
Solitary touching special
Simples for
Medicines.
692

condited and corrected, (which of late are grown into some credit) are of the same nature. So the *Parts of Beasts Putrefied* (as *Castoreum* and *Musk*, which have extream *Subtil Parts*) are to be placed amongst them. We see also that *Putrefaction of Plants* (as *Agarick* and *Fews-Ear*) are of greatest virtue. The *Cause* is, for that *Putrefaction* is the subtlest of all *Motions* in the *Parts of Bodies*: And since we cannot take down the *Lives of Living Creatures*, (which some of the *Paracelsians* say (if they could be taken down) would make us *Immortal*;) the next is for *Subtily of Operation*, to take *Bodies Putrefied*, such as may be safely taken.

Experiments
in Consort
touching Ve-
nus.

693

IT hath been observed by the *Ancients*, that *much use of Venus* doth *Dim* the *Sight*; and yet *Eunuchs*, which are unable to generate, are (nevertheless) also *Dim-sighted*. The *Cause of Dimness of Sight* in the former is the *Expence of Spirits*; in the latter, the *Over-moisture of the Brains*; for the *Over-moisture of the Brain* doth thicken the *Spirits Visual*, and obstructeth their passages; as we see by the decay in the *Sight in Age*, where also the *Diminution of the Spirits* concurrereth as another *Cause*. We see also that *Blindness* cometh by *Rheums* and *Cataracts*. Now in *Eunuchs* there are all the notes of *Moisture*; as the swelling of their *Thighs*, the looseness of their *Belly*, the smoothness of their *Skin*, &c.

694

The *Pleasure in the Act of Venus* is the greatest of the *Pleasures of the Senses*: the matching of it with *Itch* is improper, though that also be pleasing to the touch; but the *Causes* are profound. First, all the *Organs* of the *Senses* qualifie the *Motions of the Spirits*, and make so many several *Species of Motions*, and *Pleasures or Displeasures* thereupon, as there be *Diversities of Organs*. The *Instruments of Sight, Hearing, Taste and Smell*, are of several frame, and so are the *Parts for Generation*: Therefore *Scaliger* doth well to make the *Pleasure of Generation a sixth Sense*. And if there were any other differing *Organs* and qualified *Perforations* for the *Spirits* to pass, there would be more then the *Five Senses*: Neither do we well know, whether some *Beasts and Birds* have not *Senses* that we know not; and the very *Sent of Dogs* is almost a *Sense* by it self. Secondly, the *Pleasures of the Touch* are greater and deeper then those of the other *Senses*, as we see in *Warming upon Cold*, or *Refrigeration upon Heat*: For as the *Pains of the Touch* are greater then the *Offences of other Senses*, so likewise are the *Pleasures*. It is true, that the *Affecting of the Spirits immediately*, and (as it were) without an *Organ*, is of the greatest *Pleasure*; which is but in two things, *Sweet smells*, and *Wine*; and the like *Sweet vapours*. For *Smells*, we see their great and sudden effect in fetching *Men* again when they swown: For *Drink*, it is certain, that the *Pleasure of Drunkenness* is next the *Pleasure of Venus*: And *Great Foyes* (likewise) make the *Spirits* move and touch themselves: And the *Pleasure of Venus* is somewhat of the same kinde.

695

It hath been always observed, that *Men* are more inclined to *Venus* in the *Winter*, and *Women* in the *Summer*. The *Cause* is, for that the *Spirits in a Body* more hot and dry, (as the *Spirits of Men* are) by the *Summer* are more exhiled and dissipated, and in the *Winter* more condensed and kept entire; but in *Bodies* that are cold and moist, (as *Womens* are) the *Summer* doth cherish the *Spirits*, and calleth them forth, the *Winter* doth dull them. Furthermore, the *Abstinence or Intermision of the use of Venus in Moist and well habituate Bodies*, breedeth a *Number of Diseases*; and especially dangerous *Impostumations*. The reason is evident, for that it is a principal *Evacuation*, especially of the *Spirits*; for of the *Spirits*, there is scarce any *Evacuation*,

but

but in *Venus* and *Exercise*. And therefore the *Omission* of either of them breedeth all *Diseases* of *Repletion*.

The *Nature* of *Vivification* is very worthy the enquiry: And as the *Nature* of *Things* is commonly better perceived in small then in great, and in unperfect then in perfect, and in parts then in whole; so the *Nature* of *Vivification* is best inquired in *Creatures* bred of *Putrefaction*. The *Contemplation* whereof hath many *Excellent Fruits*. First, in *Disclosing* the *Original* of *Vivification*. Secondly, in *Disclosing* the *Original* of *Figuration*. Thirdly, in *Disclosing* many things in the *Nature* of *Perfect Creatures*, which in them lie more hidden. And fourthly, in *Traducing* by way of *Operation* some *Observations* in the *Insecta*, to work *Effects* upon *Perfect Creatures*. Note, that the word *Insecta* agreeth not with the *Matter*, but we ever use it for brevities sake, intending by it *Creatures* bred of *Putrefaction*.

Experiments
in Consort
touching the
Insecta.

The *Insecta* are found to breed out of several *Matters*: Some breed of *Mud* or *Dung*; as the *Earth-worms*, *Eels*, *Snakes*, &c. For they are both *Putrefactions*: For *Water* in *Mud* doth putrefie, as not able to preserve it self; and for *Dung*, all *Excrements* are the *Refuse* and *Putrefactions* of *Nourishment*. Some breed in *Wood*, both growing and cut down. *Quare* in what *Woods* most, and at what seasons. We see that the *Worms* with many feet, which round themselves into balls, are bred chiefly under *Logs* of *Timber*, but not in the *Timber*; and they are said to be found also (many times) in *Gardens* where no *Logs* are. But it seemeth their *Generation* requireth a *Coverture* both from *Sun*, and *Rain* or *Dew*, as the *Timber* is; and therefore they are not *Venemous*, but (contrariwise) are held by the *Physicians* to clarify the *Bloud*. It is observed that *Cimices* are found in the holes of *Bed-sides*. Some breed in the *Hair* of *Living Creatures*; as *Lice* and *Tikes*, which are bred by the *Sweat* close kept, and somewhat airified by the *Hair*. The *Excrements* of *Living Creatures* do not only breed *Insecta* when they are excerned, but also while they are in the *Body*, as in *Worms*, whereto Children are most subject, and are chiefly in the *Guts*. And it hath been lately observed by *Physicians*, that in many *Pestilent Diseases* there are *Worms* found in the upper parts of the body, where *Excrements* are not, but only *Humors* putrefied. *Fleas* breed principally of *Straw* or *Mats*, where there hath been a little *Moisture*; or the *Chamber* and *Bed-straw* kept close, and not aired. It is received that they are killed by strewing *Wormwood* in the *Rooms*. And it is truly observed, that *Bitter things* are apt rather to kill then engender *Putrefaction*; and they be *Things* that are *Fat* or *Sweet* that are aptest to *Putrefie*. There is a *Worm* that breedeth in *Meal*, of the shape of a large white *Maggot*, which is given as a great dainty to *Nightingales*. The *Moth* breedeth upon *Cloth*, and other *Lanifices*; especially if they be laid up dankish and wet. It delighteth to be about the *Flame* of a *Candle*. There is a *Worm* called a *Weevil*, bred under *Ground*, and that feedeth upon *Roots*, as *Parsnips*, *Carrots*, &c. Some breed in *Waters*, especially shaded; but they must be by *Standing waters*; as the *Water-Spider* that hath six *Legs*. The *Fly* called the *Gad-fly* breedeth of somewhat that swimmeth upon the top of the *Water*, and is most about *Ponds*. There is a *Worm* that breedeth of the *Dregs*
of

of *Wine* decayed, which afterwards (as is observed by some of the *Ancients*) turneth into a *Gnat*. It hath been observed by the *Ancients*, that there is a *Worm* that breedeth in old *Snow*, and is of colour Reddish, and dull of motion, and dieth soon after it cometh out of *Snow*: which should shew that *Snow* hath in it a secret *Warmth*, for else it could hardly Vivifie. And the reason of the dying of the *Worm*, may be the sudden exhaling of that little *Spirit* as soon as it cometh out of the *Cold*, which had shut it in. For as *Butter-flies* quicken with *Heat*, which were benumbed with *Cold*; so *Spirits* may exhale with *Heat*, which were preserved in *Cold*. It is affirmed both by the *Ancient* and *Modern Observation*, that in *Furnaces* of *Copper* and *Brass*, where *Chalcites* is (which is *Vitriol*) often cast in to mend the working, there riseth suddenly a *Fly*, which sometimes moveth, as if it took hold on the walls of the *Furnace*; sometimes is seen moving in the *Fire* below; and dieth presently as soon as it is out of the *Furnace*. Which is a noble Instance, and worthy to be weighed; for it sheweth that as well *Violent Heat* of *Fire*, as the *Gentle Heat* of *Living Creatures*, will vivifie, if it have Matter proportionable. Now the great *Axiome* of *Vivification* is, that there must be *Heat* to dilate the *Spirit* of the *Body*, an *Active Spirit* to be dilated, *Matter Viscous* or *Tenacious* to hold in the *Spirit*, and that *Matter* to be put forth and *Figured*. Now a *Spirit* dilated by so ardent a *Fire* as that of the *Furnace*, as soon as ever it cooleth never so little, congealeth presently. And (no doubt) this *Action* is furthered by the *Chalcites*, which hath a *Spirit* that will put forth and germinate, as we see in *Chymical Trials*. Briefly, most *Things Putrefied* bring forth *Insecta* of several names: but we will not take upon us now to enumerate them all.

697

The *Insecta* have been noted by the *Ancients* to feed little: But this hath not been diligently observed; for *Grashoppers* eat up the *Green* of whole *Countries*, and *Silk-worms* devour *Leaves* swiftly, and *Ants* make great provision. It is true, that *Creatures* that sleep and rest much, eat little, as *Dormice* and *Bats*, &c. They are all without *Bloud*: which may be, for that the *juice* of their *Bodies* is almost all one; not *Bloud*, and *Flesh*, and *Skin*, and *Bone*, as in perfect *Creatures*. The *Integral parts* have extreme variety, but the *Similar parts* little. It is true that they have (some of them) *Diaphragme*, and an *Intestine*; and they have all *Skins*, which in most of the *Insecta* are cast often. They are not (generally) of long life: yet *Bees* have been known to live seven years; and *Snakes* are thought, the rather for the *Casting* of their *Spoil*, to live till they be old; and *Eels*, which many times breed of *Putrefaction*, will live and grow very long; and those that interchange from *Worms* to *Flies* in the *Summer*, and from *Flies* to *Worms* in the *Winter*, have been kept in *Boxes* four years at the least. Yet there are certain *Flies* that are called *Ephemera* that live but a day. The *Cause* is the exility of the *Spirit*, or perhaps the absence of the *Sun*; for that if they were brought in, or kept close, they might live longer. Many of the *Insecta* (as *Butter-flies* and other *Flies*) revive easily, when they seem dead, being brought to the *Sun* or *Fire*. The *Cause* whereof is, the *Diffusion* of the *Vital Spirit*, and the easie dilating of it by a little *Heat*. They stir a good while after their *Heads* are off, or that they be cut in pieces; which is caused also for that their *Vital Spirits* are more diffused throughout all their *Parts*, and less confined to *Organs* then in *Perfect Creatures*.

698

The *Insecta* have *Voluntary Motion*, and therefore *Imagination*. And whereas some of the *Ancients* have said that their *Motion* is indeterminate, and their *Imagination* indefinite, it is negligently observed; for *Ants* goe right forwards,

forwards to their Hills; and *Bees* do (admirably) know the way from a Floury Heath two or three Miles off to their Hives. It may be *Goats* and *Flies* have their *Imagination* more mutable and giddy, as *small Birds* likewise have. It is said by some of the *Ancients*, that they have onely the *Sense* of *Feeling*, which is manifestly untrue; for if they goe forth right to a Place, they must needs have *Sight*: Besides, they delight more in one *Flour* or *Herb* then in another, and therefore have *Tast*: And *Bees* are called with *Sound* upon *Brass*, and therefore they have *Hearing*. Which sheweth likewise that though their *Spirits* be diffused, yet there is a *Seat* of their *Senses* in their *Head*.

Other Observations concerning the *Insecta*, together with the Enumeration of them, we referre to that place where we mean to handle the Title of *Animals* in general.

A Man leapeth better with *Weights* in his *Hands* then without. The Cause is, for that the *Weight* (if it be proportionable) strengthneth the *Sinews*, by *Contracting* them. For otherwise, where no *Contraction* is needful, *Weight* hindreth. As we see in *Horse-Races*, *Men* are curious to foresee that there be not the least *Weights* upon the one *Horse* more then upon the other. In *Leaping* with *Weights*, the *Arms* are first cast backwards, and then forwards, with so much the greater Force; for the *Hands* go backward before they take their Raise. *Quare*, if the contrary *Motion* of the *Spirits*, immediately before the *Motion* we intend, doth not cause the *Spirits* as it were to break forth with more force; as *Breath* also drawn, and kept in, cometh forth more forcibly: And in *Casting* of any thing, the *Arms*, to make a greater *Swing*, are first cast backward.

Experiment
Solitary touching
Leaping.
699

OF *Musical Tones* and *Unequal Sounds* we have spoken before; but touching the *Pleasure* and *Displeasure* of the *Senses* not so fully. *Harsh Sounds*, as of a *Saw* when it is sharpned, *Grinding* of one *Stone* against another, *Squeaking* or *Screeching Noises*, make a *Shivering* or *Horror* in the *Body*, and set the *Teeth* on edge. The Cause is, for that the *Objects* of the *Ear* do affect the *Spirits* (immediately) most with *Pleasure* and *Offence*. We see there is no *Colour* that affecteth the *Eie* much with *Displeasure*. There be *Sights* that are *Horrible*, because they excite the *Memory* of *Things* that are *Odious* or *Fearful*; but the same *Things* painted do little affect. As for *Smells*, *Tasts* and *Touches*, they be *Things* that do affect by a *Participation* or *Impulsion* of the *Body* of the *Object*. So it is *Sound* alone that doth immediatly and incorporeally affect most. This is most manifest in *Musick*, and *Concords* and *Discords* in *Musick*: For all *Sounds*, whether they be *Sharp* or *Flat*, if they be *Sweet*, have a *Roundness* and *Equality*; and if they be *harsh*, are *Unequal*: For a *Discord* it self is but a *Harshness* of divers *Sounds* meeting. It is true, that *Inequality*, not stayed upon, but passing, is rather an increase of *Sweetness*; as in the *Purling* of a *Wreathed String*, and in the *Raucity* of a *Trumpet*, and in the *Nightingale-pipe* of a *Regal*, and in a *Discord* straight falling upon a *Concord*: But if you stay upon it, it is *Offensive*. And therefore there be these three *Degrees* of *Pleasing* and *Displeasing* in *Sounds*; *Sweet Sounds*, *Discords*, and *Harsh Sounds*, which we call by divers Names, as *Screeching*, or *Grating*, such as we now speak of. As for the *Setting* of the *Teeth* on *Edge*, we plainly see what an intercourse there is between the *Teeth* and the *Organ* of the *Hearing*, by the taking of the end of a *Bow* between the *Teeth*, and *Striking* upon the *String*.

Experiment
Solitary touching the
Pleasures and
Displeasures of
the Senses, especially of
Hearing.

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NATURAL HISTORY,

Century VIII.



Here be *Minerals* and *Fossiles* in great Variety, but of *Veins of Earth Medicinal* but few. The chief are, *Terra Lemnia*, *Terra Sigillata communis*, and *Bolus Arminius*; whereof *Terra Lemnia* is the chief. The *Virtues* of them are for *Curing of Wounds*, *Stanching of Blood*, *Stopping of Fluxes and Rheums*, and *Arresting the Spreading of Poison, Infection, and Putrefaction*: And they have of all other *Simples* the perfectest and purest *Quality of Drying*, with little or no Mixture of

any other *Quality*. Yet it is true, that the *Bolus Arminius* is the most Cold of them, and that *Terra Lemnia* is the most Hot, for which cause the *Island Lemnos* where it is digged, was in the old *Fabulous Ages* consecrated to *Vulcan*.

About the *Bottoms* of the *Streights* are gathered great quantities of *Sponges*, which are gathered from the sides of *Rocks*, being as it were a large, but rough *Moss*. It is the more to be noted, because that there be but few *Substances, Plant-like*, that grow deep within the *Sea*, for they are gathered sometime fifteen *Fathom* deep: And when they are laid on *Shore*, they seem to be of great *Bulk*; but crushed together, will be transported in a very small *Room*.

It seemeth that *Fish* that are used to the *Salt-water*, do nevertheless delight more in *Fresh*. We see that *Salmons* and *Swelts* love to get into *Rivers*, though it be against the *Stream*. As the *Haven of Constantinople* you shall have great quantities of *Fish* that come from the *Euxine Sea*, that when they come into the *Fresh-water*, do inebriate and turn up their bellies, so as you may take them with your hand. I doubt here hath not been sufficient Ex-

Experiment
Solitary touching
Veins of
Medicinal
Earth.

701

Experiment
Solitary touching
the
Growth of
Sponges.

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Experiment
Solitary touching
Sea-Fish
pus in Fresh
Waters.

703

periment made of putting *Sea-Fish* into *Fresh Water*, *Ponds*, and *Pools*. It is a thing of great use and pleasure; for so you may have them new at some good distance from the *Sea*: And besides, it may be the *Fish* will eat the pleasanter, and may fall to breed. And it is said, that *Colechester Oysters*, which are put into *Pits*, where the *Sea* goeth and cometh, (but yet so that there is a *Fresh Water* coming also to them when the *Sea* voideth) become by that means fatter and more grown.

Experiment
Solitary touch-
ing Attraction by Simi-
litude of Sub-
stance.

704

THE *Turkish Bow* giveth a very forcible *Shot*, inasmuch as it hath been known, that the *Arrow* hath pierced a *Steel Target*, or a piece of *Brass* of two Inches thick: But that which is more strange, the *Arrow*, if it be headed with *Wood*, hath been known to pierce through a piece of *Wood* of eight Inches thick. And it is certain that we had in use at one time, for *Sea-fight*, short *Arrows*, which they called *Sprights*, without any other Heads, save *Wood* sharpened; which were discharged out of *Muskets*, and would pierce through the sides of *Ships*, where a *Bullet* would not pierce. But this dependeth upon one of the greatest *Secrets* in all *Nature*; which is, that *Similitude of Substance* will cause *Attraction*, where the Body is wholly freed from the *Motion of Gravity*: for if that were taken away, *Lead* would draw *Lead*, and *Gold* would draw *Gold*, and *Iron* would draw *Iron* without the help of the *Load-stone*. But this same *Motion of Weight or Gravity* (which is a mere *Motion of Matter*, and hath no affinity with the *Form* or *Kinde*) doth kill the other *Motion*, except it self be killed by a violent *Motion*: and in these *Instances of Arrows*, for then the *Motion of Attraction by Similitude of Substance* beginneth to shew it self. But we shall handle this point of *Nature* fully in due place.

Experiment
Solitary touch-
ing certain
Drinks in Tur-
ky.

705

THEY have in *Turky*, and the *East* certain *Confections*, which they call *Serwets*, which are like to *Candid Conserve*, and are made of *Sugar* and *Limon*, or *Sugar* and *Citrons*, or *Sugar* and *Rosies*, and some other *Flowers*, and some mixture of *Amber* for the more delicate persons: And those they dissolve in *Water*, and thereof make their *Drink*, because they are forbidden *Wine* by their *Law*. But I do much marvel that no *Englishman*, or *Dutchman*, or *German*, doth set up *Brewing* in *Constantinople*, considering they have such quantity of *Barley*. For as for the general sort of *Men*, frugality may be the Cause of *Drinking water*, for that it is no small saving to pay nothing for ones *Drink*: But the better sort might well be at the cost. And yet I wonder the less at it, because I see *France*, *Italy*, or *Spain* have not taken into use *Beer* or *Ale*, which (perhaps) if they did, would better both their *Heaths* and their *Complexions*. It is likely it would be matter of great gain to any that should begin in *Turky*.

Experiments
in Comfort
touching
Sweat.

706

IN *Bathing in Hot water*, *Sweats* (nevertheless) cometh not in the *Parts under the water*. The Cause is first, for that *Sweat* is a kinde of *Colliquation*. And that kinde of *Colliquation* is not made either by an *Over-dry Heat*, or an *Over-moist Heat*. For *Over-moisture* doth somewhat extinguish the *Heat*; as we see that even *Hot water* quencheth *Fire*; and *Over-dry Heat* shutteth the *Pores*. And therefore *Men* will sooner *Sweat* covered before the *Sun* or *Fire*, then if they stood naked. And *Arabian Bottles* filled with *Hot water*, do provoke in *Bed* a *Sweat* more faintly than *Brick-bats*. Secondly, *Hot water* doth cause *Evaporation* from the *Skin*; so as it spendeth the *Matter* in those parts under the *Water*, before it issueth in

Sugar.

Sweat. Again, *Sweat* cometh more plentifully, if the *Heat* be increased by *Degrees*, then if it be greatest at first, or equal. The *Cause* is, for that the *Pores* are better opened by a *Gentle heat* then by a more *Violent*; and by their opening the *Sweat* issueth more abundantly. And therefore *Physicians* may doe well when they provoke *Sweat* in bed by *Bottles*, with a *Decoction* of *Sudorifick herbs* in *Hot water*, to make two *Degrees of Heat* in the *Bottles*; and to lay in the bed the *less-Heated* first, and after half an hour the *more-Heated*.

Sweat is salt in *Tast*: the *Cause* is, for that that *Part* of the *Nourishment* which is *Fresh* and *Sweet* turneth into *Bloud* and *Flesh*; and the *Sweat* is only that *Part* which is *Separate* and *Excerned*. *Bloud* also raw hath some *Salt-ness* more then *Flesh*; because the *Assimilation* into *Flesh* is not without a little and subtile *Excretion* from the *Bloud*.

Sweat cometh forth more out of the *upper Parts* of the *Body* then the *Lower*. The *Reason* is, because those *Parts* are more replenished with *Spirits*; and the *Spirits* are they that put forth *Sweat*: Besides, they are less *Fleshy*, and *Sweat* issueth (chiefly) out of the *Parts* that are less *Fleshy* and more *Dry*, as the *Fore-head* and *Breast*.

Men *sweat* more in *Sleep* then *Waking*; and yet *Sleep* doth rather stay other *Fluxions* then cause them; as *Rheums*, *Loosness* of the *Body*, &c. The *Cause* is, for that in *Sleep* the *Heat* and *Spirits* do naturally move inwards, and there rest. But when they are collected once within, the *Heat* becometh more violent and irritate, and thereby expelleth *Sweat*.

Cold Sweats are (many times) *Mortal* and near *Death*; and alwaies ill and suspected; as in *Great Fears*, *Hypochondriacal Passions*, &c. The *Cause* is, for that *Cold Sweats* come by a *Relaxation* or *Forfaking* of the *Spirits*, whereby the *Mixture* of the *Body*, which *Heat* did keep firm in the *Parts*, severeth and issueth out.

In those *Diseases* which cannot be discharged by *Sweat*, *Sweat* is ill; and rather to be stayed; as in *Diseases* of the *Lungs*, and *Fluxes* of the *Belly*: but in those *Diseases* which are expelled by *Sweat* it easeth and lightneth; as in *Agues*, *Pestilences*, &c. The *Cause* is, for that *Sweat* in the latter sort is partly *Critical*, and sendeth forth the *Matter* that offendeth: but in the former, it either proceedeth from the *Labour* of the *Spirits*, which sheweth them oppressed; or from *Motion* of *Consent*; when *Nature* not able to expel the *Disease* where it is seated; moveth to an *Expulsion* indifferent over all the *Body*.

THE *Nature* of the *Glo-worm* is hitherto not well observed. Thus much we see, that they breed chiefly in the *hottest Moneths* of *Summer*; and that they breed not in *Champaign*, but in *Bushes* and *Hedges*. Whereby it may be conceived, that the *Spirit* of them is very fine; and not to be refined but by *Summer heats*: And again, that by reason of the fineness, it doth easily exhale. In *Italy* and the *Hotter Countries* there is a *Fly* they call *Luciole*, that shineth as the *Glo-worm* doth; and it may be is the *Flying-Glo-worm*. But that *Fly* is chiefly upon *Fens* and *Marishes*. But yet the two former *Observations* hold; for they are not seen but in the *Heat* of *Summer*: And *Sedge*, or other *Green* of the *Fens*, give as good shade as *Bushes*. It may be the *Glo-worms* of the *Cold Countries* ripen not so far as to be *Winged*.

THE *Passions* of the *Minde* work upon the *Body* the *Impressions* following. *Fear* causeth *Paleness*, *Trembling*, the *Standing* of the *Hair* up-
right,

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Experiment
Solitary touch-
ing the
Glo-worm.

712

Experiments
in Consort
touching the
Impressions
which the
Passions of the
Minde make
upon the *Body*.

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right, Starting, and Screeching. The *Paleness* is caused, for that the *Bloud* runneth inward to succour the *Heart*. The *Trembling* is caused, for that through the *Flight* of the *Spirits* inward, the *Outward Parts* are destituted, and not sustained. *Standing upright* of the *Hair* is caused, for that by *Shutting* of the *Pores* of the *Skin*, the *Hair* that lieth alsoop must needs rise. *Starting* is both an *Apprehension* of the *Thing feared*, (and in that kind it is a *Motion* of *Shrinking*;) and likewise an *Inquisition* in the beginning what the *Matter* should be, (and in that kind it is a *Motion* of *Erection*;) and therefore when a *Man* would listen suddenly to any thing, he *Starteth*, for the *Starting* is an *Erection* of the *Spirits* to attend. *Screeching* is an *Appetite* of *Expelling* that which suddenly striketh the *Spirits*. For it must be noted, that many *Motions*, though they be unprofitable to expel that which hurteth, yet they are *Offers* of *Nature*, and cause *Motions* by *Consent*, as in *Groanings*, or *Crying* upon *Pain*.

Grief and *Pain* cause *Sighing*, *Sobbing*, *Groaning*, *Screeching*, and *Rearing*. *Tears*, *Distorting* of the *Face*, *Grinding* of the *Teeth*, *Sweating*, *Sighing* is caused by the *Drawing in* of a greater *Quantity* of *Breath* to refresh the *Heart* that laboureth: like a great *Draught* when one is thirsty. *Sobbing* is the same thing stronger. *Groaning*, and *Screeching*, and *Rearing*, are caused by an *Appetite* of *Expulsion*, as hath been said; for when the *Spirits* cannot expel the thing that hurteth, in their strife to do it, by *Motion* of *Consent*, they expel the *Voice*. And this is when the *Spirits* yield, and give over to resist; for if one do constantly resist *Pain*, he will not groan; *Tears* are caused by a *Contraction* of the *Spirits* of the *Brain*; which *Contraction* by consequence astringeth the *Moisture* of the *Brain*, and thereby sendeth *Tears* into the *Eies*. And this *Contraction* or *Compression* causeth also *Wringing* of the *Hands*; for *Wringing* is a *Gesture* of *Expectation* of *Moisture*. The *Distorting* of the *Face* is caused by a *Contention*, first to bear and resist, and then to expel; which maketh the *Parts* knit first, and afterwards open. *Grinding* of the *Teeth* is caused (likewise) by a *Gathering* and *Serring* of the *Spirits* together to resist, which maketh the *Teeth* also to set hard one against another. *Sweating* is also a *Compound Motion* by the *Labour* of the *Spirits*, first to resist, and then to expel.

Joy causeth a *Cheerfulness* and *Vigour* in the *Eies*, *Singing*, *Leaping*, *Dancing*, and sometimes *Tears*. All these are the effects of the *Dilatation* and *Coming forth* of the *Spirits* into the *Outward Parts*, which maketh them more *Lively* and *Stirring*. We know it hath been seen, that *Excessive sudden Joy* hath caused *present Death*, while the *Spirits* did spread so much as they could not retire again. As for *Tears*, they are the effects of *Compression* of the *Moisture* of the *Brain*, upon *Dilatation* of the *Spirits*. For *Compression* of the *Spirits* worketh an *Expression* of the *Moisture* of the *Brain* by *Consent*, as hath been said in *Grief*. But then in *Joy* it worketh it diversly, viz. by *Propulsion* of the *Moisture*, when the *Spirits* dilate, and occupy more *Room*.

Anger causeth *Paleness* in some, and the *Going* and *Coming* of the *Colour* in others; also *Trembling* in some, *Swelling*, *Foaming* at the *Mouth*, *Stamping*, *Bending* of the *Fist*. *Paleness*, and *Going* and *Coming* of the *Colour*, are caused by the *Burning* of the *Spirits* about the *Heart*, which to refresh themselves call in more *Spirits* from the *Outward parts*. And if the *Paleness* be alone, without *sending forth* the *Colour* again, it is commonly joyned with some *Fear*. But in many there is no *Paleness* at all, but contrariwise *Redness* about the *Cheeks* and *Gills*; which is by the *Sending forth* of the

Spirits in an Appetite to Revenge. Trembling in Anger is likewise by a *Calling in of the Spirits*; and is commonly when Anger is joyned with *Fear*. Swelling is caused both by a *Dilatation of the Spirits* by *Over-heating*, and by a *Liquefaction* or *Boiling* of the *Humours* thereupon. *Foaming* at the Mouth is from the same Cause, being an *Ebullition*. *Stamping* and *Bending* of the Fists are caused by an *Imagination* of the Act of *Retaliation*. *Light Displeasure* or *Dislike* causeth *Shaking* of the Head, *Frowning*, and *Knitting* of the *Brow*. These Effects arise from the same Causes that *Trembling* and *Horror* do; namely, from the *Retiring* of the *Spirits*, but in a less degree. For the *Shaking* of the Head is but a slow and definite *Trembling*; and is a *Gesture* of *Slight Refusal*. And we see also, that a *Dislike* causeth (often) that *Gesture* of the Hand which we use when we refuse a thing, or warn it away. The *Frowning* and *Knitting* of the *Brow* is a *Gathering* or *Serring* of the *Spirits* to resist in some measure. And we see also, this *Knitting* of the *Brow* will follow upon earnest *Studying*, or *Cogitation* of any thing, though it be without *Dislike*. *Shame* causeth *Blushing*, and *Casting down* of the *Eyes*. *Blushing* is the *Refort* of *Blood* to the *Face*; which in the *Passion* of *Shame* is the Part that labourerth most. And although the *Blushing* will be seen in the whole *Breast*; if it be *Naked*, yet that is but in *passage* to the *Face*. As for the *Casting down* of the *Eyes*, it proceedeth of the *Reverence* a man beareth to other men, whereby, when he is ashamed, he cannot endure to look firmly upon others: And we see that *Blushing*, and the *Casting down* of the *Eyes* both, are more when we come before many, *Ore Pompeii quid mollius? Nunquam non coram pluribus erubuit*: and likewise when we come before *Great* or *Reverend* Persons. *Pity* causeth sometimes *Tears*, and a *Flexion* or *Cast* of the *Eyes* aside. *Tears*

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come from the same Cause that they do in *Grief*: For *Pity* is but *Grief* in anothers behalf. The *Cast* of the *Eyes* is a *Gesture* of *Aversion* or *Lothness*, to behold the *Object* of *Pity*.

719

Wonder causeth *Astonishment*, or an *Immovable Posture* of the *Body*, *Casting up* of the *Eyes* to *Heaven*, and *Lifting up* of the *Hands*. For *Astonishment*, it is caused by the *Fixing* of the *Minde* upon one *Object* of *Cogitation*, whereby it doth not spaiate and transcurre as it useth: For in *Wonder* the *Spirits* lie not, as in *Fear*; but onely settle, and are made less apt to move. As for the *Casting up* of the *Eyes*, and *Lifting up* of the *Hands*, it is a kind of *Appeal* to the *Deity*; which is the *Author*, by *Power* and *Providence*, of *Strange Wonders*.

720

Laughing causeth a *Dilatation* of the *Mouth* and *Lips*; a *Continued Expulsion* of the *Breath*, with the loud *Noise*, which maketh the *Interjection* of *Laughing*, *Shaking* of the *Breast* and *Sides*; *Running* of the *Eyes* with *Water*, if it be violent and continued: Wherein first it is to be understood, that *Laughing* is scarce (properly) a *Passion*, but hath his *Source* from the *Intellect*; for in *Laughing* there ever precedeth a *Conceit* of somewhat *Ridiculous*. And therefore it is proper to *Man*. Secondly, that the *Cause* of *Laughing* is but a *light Touch* of the *Spirits*, and not so deep an *Impression* as in other *Passions*. And therefore (that which hath no *Affinity* with the *Passions* of the *Minde*) it is moved, and that in great vehemency, onely by *Tickling* some *Parts* of the *Body*. And we see that *Man* even in a *Grieved* state of *Minde*, yet cannot sometimes forbear *Laughing*. Thirdly, it is ever joyned with some *Degree* of *Delight*: And therefore *Exhilaration* hath some *Affinity* with *Foy*, though it be much *Lighter Motion*. *Res fervere est verum Gaudium*.

721

dim. Fourthly, that the *Object* of it is *Deformity, Absurdity, Shrewdturns,* and the like. Now to speak of the *Causes* of the *Effects* before mentioned, whereunto these *General Notes* give some *Light*. For the *Dilatation* of the *Mouth and Lips, Continued expulsion* of the *Breath and Voice,* and *Shaking* of the *Breast and Sides,* they proceed (all) from the *Dilatation* of the *Spirits,* especially being sudden. So likewise the *Running* of the *Eies* with *Water,* (as hath been formerly touched, where we spoke of the *Tears* of *Poy* and *Grief*) is an effect of *Dilatation* of the *Spirits.* And for *Suddenness* it is a great *Part* of the *Matter.* For we see that any *Shrewdturn* that lighteth upon another, or any *Deformity, &c.* moveth *Laughter* in the instant, which after a little time it doth not. So we cannot *Laugh* at any thing after it is *Stale,* but whilst it is *New.* And even in *Tickling,* if you *Tickle* the *Sides,* and give warning, or give a *Hard* or *Continued touch,* it doth not move *Laughter* so much.

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Last causeth a *Flagrancy* in the *Eies,* and *Priapisme.* The *Cause* of both these is, for that in *Lust* the *Sight* and the *Touch* are the things desired; and therefore the *Spirits* resort to those parts which are most affected. And note well in general; (for that great use may be made of the *Observation*) that (evermore) the *Spirits* in all *Passions* resort most to the *Parts* that labour most, or are most affected. As in the last which hath been mentioned, they resort to the *Eies* and *Venerous parts;* in *Fear* and *Anger* to the *Heart;* in *Shame* to the *Face;* and in *light Dislikes* to the *Head.*

Experiments
in Consort
touching
Drunkenness.

It hath been observed by the *Ancients* and is yet believed, that the *Sperm* of *Drunken men* is *Unfruitful.* The *Cause* is, for that it is *Over-moistened;* and wanteth *Spissitude.* And we have a merry saying, That they that goe *Drunk* to *Bed* get *Daughters.*

Drunken men are taken with a plain *Defect* or *Destitution* in *Voluntary Motion;* they reel, they tremble, they cannot stand, nor speak strongly. The *Cause* is, for that the *Spirits* of the *Wine* oppress the *Spirits Animal,* and occupate part of the place where they are, and so make them weak to move. And therefore *Drunken men* are apt to fall asleep. And *Opiates* and *Stupefactive*s (as *Poppy, Henbane, Hemlock, &c.*) induce a kinde of *Drunkenness* by the *Grossness* of their *Vapour,* as *Wine* doth by the *Quantity* of the *Vapour.* Besides, they rob the *Spirits Animal* of their *Matter* whereby they are nourished; for the *Spirits* of the *Wine* prey upon it as well as they; and so they make the *Spirits* less supple and apt to move.

Drunken men imagine every *Thing* turneth round; they imagine also that *Things* come upon them; they see not well *Things* as farre off; those *Things* that they see near hand, they see out of their place; and (sometimes) they see things double. The *Cause* of the imagination that *Things* turn round is, for that the *Spirits* themselves turn, being compressed by the *Vapour* of the *Wine;* (for any liquid *Body* upon *Compression* turneth, as we see in *Water*.) And it is all one to the *Sight* whether the *Visual Spirits* move, or the *Object* moveth, or the *Medium* moveth. And we see that long *Turning round* breedeth the same imagination. The *Cause* of the imagination that *Things* come upon them is, for that the *Spirits visual* themselves draw back; which maketh the *Object* seem to come on; and besides, when they see *Things* turn round and move, *Fear* maketh them think they come upon them. The *Cause* that they cannot see *Things* as farre off is the *Weakness* of the *Spirits:* for in every *Megrin* or *Kertigo,* there is an *Obtenebration* joyned with a semblance of *Turning round;* which we see also in the lighter sort of *Swoonings.*

things. The Cause of Seeing things out of their Place is the Refraction of the Spirits Visual; for the Vapour is as an unequal Medium; and it is as the sight of things out of place in Water. The Cause of Seeing things double is the Swift and Unquiet Motion of the Spirits (being oppressed) to and fro; for (as was said before) the Motion of the Spirits Visual and the Motion of the Object make the same Appearances; and for the swift Motion of the Object, we see that if you fillip a Lute-string, it sheweth double or treble.

Men are sooner Drunk with small Draughts then with Great. And again, Wine sugred inebriateth less then Wine pure. The Cause of the former is, for that the Wine descendeth not so fast to the Bottom of the Stomack, but maketh longer stay in the Upper part of the Stomack, and sendeth Vapours faster to the Head; and therefore inebriateth sooner. And for the same reason, Sops in Wine (quantity for quantity) inebriate more then Wine of it self. The Cause of the latter is, for that the Sugar doth inspissate the Spirits of the Wine, and maketh them not so easie to resolve into Vapour. Nay further, it is thought to be some remedy against Inebriating, if Wine sugred be taken after Wine pure. And the same effect is wrought either by Oil or Milk taken upon much Drinking.

THE Use of Wine in Dry and Consumed Bodies is hurtful; in Moist and Full Bodies it is good. The Cause is, for that the Spirits of the Wine do prey upon the Dew or Radical Moisture, (as they term it) of the Body, and so deceive the Animal Spirits. But where there is Moisture enough, or superfluous, there Wine helpeth to digest and defecate the Moisture.

THE Caterpillar is one of the most general of Worms, and breedeth of Dew and Leaves; for we see infinite number of Caterpillars which breed upon Trees and Hedges, by which the Leaves of the Trees or Hedges are in great part consumed; as well by their breeding out of the Leaf, as by their feeding upon the Leaf. They breed in the Spring chiefly, because then there is both Dew and Leaf. And they breed commonly when the East Winds have much blown: The Cause whereof is, the Driness of that Wind; for to all Vivification upon Putrefaction, it is requisite the Matter be not too Moist. And therefore we see they have Cobwebs about them, which is a sign of a Slimy Driness; as we see upon the Ground, whereupon by Dew and Sun Cobwebs breed all over. We see also the Green Caterpillar breedeth in the inward parts of Roses, especially not blown, where the Dew sticketh: But especially Caterpillars, both the greatest and the most, breed upon Cabbages, which have a Fat leaf, and apt to Putrefie. The Caterpillar toward the End of Summer waxeth Parasite, and turneth to a Butterfly, or perhaps some other Fly. There is a Caterpillar that hath a Furrow or Down upon him, and seemeth to have affinity with the Silk-worm.

THE Flies Cantharides are bred of a Worm or Caterpillar, but peculiar to certain Fruit-trees, as are the Fig-tree, the Pine-tree, and the Wild Briar; all which bear Sweet fruit; and Fruit that hath a kinde of secret Biting, or Sharpness. For the Fig hath a Milk in it that is Sweet and Corrosive: the Pine-apple hath a Kernel that is Strong and Abstersive: the Fruit of the Briar is said to make Children or those that eat them scabbed. And therefore no marvel though Cantharides have such a Corrosive and Cantharizing Quality; for there is not one other of the Insects but is bred of a Duller Matter. The Body of the Cantharides is bright-coloured; and it may be,

Experiment
Solitary touch-
ing the
Help or Hurt
of Wine,
though Moder-
ately used.

727

Experiment
Solitary touch-
ing Cater-
pillars.

728

Experiment
Solitary
touching the
Flies Cantha-
rides.

729

be, that the delicate-coloured *Dragon-Flies* may have likewise some *Corrosive Quality*.

Experiments
in Comfort
touching *Lassi-
tude*.

730

L *Assitude* is remedied by *Bathing* or *Anointing* with *Oil* and *Warm water*. The *Cause* is, for that all *Lassitude* is a kind of *Contusion*, and *Compreßion* of the *Parts*; and *Bathing* and *Anointing* give a *Relaxion* or *Emolition*: And the *Mixture* of *Oil* and *Water* is better then either of them alone, because *Water* entreteth better into the *Pores*, and *Oil* after entry softneth better. It is found also, that the *Taking* of *Tobacco* doth help and discharge *Lassitude*. The reason whereof is partly, because by *Chearing* or *Comforting* of the *Spirits*, it openeth the *Parts Compressed* or *Contused*: And chiefly, because it refresheth the *Spirits* by the *Opiate Vertue* thereof, and so dischargeth *Weariness*, as *Sleep* likewise doth.

731

In *Going up a Hill* the *Knees* will be most *Weary*; in *Going down a Hill* the *Thighs*. The *Cause* is, for that in the *Lift* of the *Feet*, when a man *Goeth up the Hill*, the weight of the *Body* beareth most upon the *Knees*; and in *Going down the Hill*, upon the *Thighs*.

Experiment
Solitary touch-
ing the
Casting of the
Skin and *Shell*
in some *Crea-
tures*:

732

THE *Casting* of the *Skin* is by the *Ancients* compared to the *Breaking* of the *Secundine* or *Call*, but not rightly; for that were to make every *Casting* of the *Skin* a new *Birth*: And besides, the *Secundine* is but a general *Cover*, not shaped according to the *Parts*; but the *Skin* is shaped according to the *Parts*. The *Creatures* that cast their *Skin* are, the *Snake*, the *Viper*, the *Grasshopper*, the *Lizard*, the *Silk-worm*, &c. Those that cast their *Shell* are, the *Lobster*, the *Crab*, the *Cra-fish*, the *Hodmandod* or *Dodman*, the *Tortoise*, &c. The *Old Skins* are found; but the *Old Shells* never: So as it is like they scale off, and crumble away by degrees. And they are known by the extream *Tenderness* and *Softness* of the *New Shell*; and somewhat by the *Freshness* of the *Colour* of it. The *Cause* of the *Casting* of *Skin* and *Shell* should seem to be the great *Quantity* of *Matter* in those *Creatures*, that is fit to make *Skin* or *Shell*; and again, the *Looseness* of the *Skin* or *Shell*, that sticketh not close to the *Flesh*. For it is certain that it is the *New Skin* or *Shell*, that putteth off the *Old*. So we see that in *Deer*, it is the *young Horn* that putteth off the *Old*. And in *Birds*, the *young Feathers* put off the *Old*. And so *Birds* that have much *Matter* for their *Beak*, cast their *Beaks*; the *New Beak* putting off the *Old*.

Experiments
in Comfort
touching the
Postures of the
Body.

733

Lying not *Erect* but *Hollow*, which is in the *Making* of the *Bed*, or with the *Legs gathered up*, which is in the posture of the *Body*, is the more *Wholesome*. The *Reason* is, the better *Comforting* of the *Stomack*, which is by that less penile: And we see that in weak *Stomacks*, the laying up of the *Legs* high, and the *Knees* almost to the *Mouth*, helpeth and comforteth. We see also that *Gally-slaves*, notwithstanding their *Misery* otherwise, are commonly *Fat* and *Fleshy*; and the *Reason* is, because the *Stomack* is supported somewhat in *Sitting*, and is penile in *Standing* or *Going*. And therefore for *Prolongation* of *Life*, it is good to chuse those *Exercises* where the *Limbs* move more then the *Stomack* and *Belly*; as in *Rowing* and in *Sawing*, being set.

734

Migrains and *Giddiness* are rather when we *Rise*, after long *Sitting*, then while we *Sit*. The *Cause* is, for that the *Vapours* which were gathered by *Sitting*, by the sudden *Motion* flie more up into the *Head*.

735

Leaning long upon any *Part* maketh it *Numme*, and as we call it, *Asleep*.
The

The Cause is, for that the *Compression* of the *Parts* suffereth not the *Spirits* to have free access; and therefore when we come out of it we feel a *Stinging* or *Pricking*, which is the *Re-entrance* of the *Spirits*.

IT hath been noted, that those *Years* are *Pestilential* and *Unwholsome*, when there are great numbers of *Frogs*, *Flies*, *Locusts*, &c. The Cause is plain; for that those *Creatures* being ingendred of *Putrefaction*, when they abound, shew a general *Disposition* of the *Year* and *Constitution* of the *Air* to *Diseases* of *Putrefaction*. And the same *Prognostick* (as hath been said before) holdeth, if you finde *Worms* in *Oak-Apples*. For the *Constitution* of the *Air* appeareth more subtilly in any of these *Things*, then to the *Sense* of *Man*.

Experiment
Solitary touching
Pestilential Years.

736

IT is an Observation amongst *Country* people, that *Years* of store of *Haws* and *Heps* do commonly portend *Cold Winters*: and they ascribe it to *God's Providence*, that (as the *Scripture* saith) reacheth even to the *Falling* of a *Sparrow*; and much more is like to reach to the *Preservation* of *Birds* in such *Seasons*. The *Natural Cause* also may be the *Want* of *Heat*, and *Abundance* of *Moisture*, in the *Summer* precedent; which putteth forth those *Fruits*, and must needs leave great *Quantity* of *Cold Vapours* not dissipate, which causeth the *Cold* of the *Winter* following.

Experiment
Solitary touching the
Prognosticks of
Hard Winters.

737

They have in *Turkey* a *Drink* called *Coffee*, made of a *Berry* of the same name, as black as *Soot*, and of a *Strong Sent*, but not *Aromatical*; which they take, beaten into powder, in *Water* as hot as they can drink it: And they take it, and sit at it in their *Coffee-Houses*, which are like our *Taverns*. This *Drink* comforteth the *Brain* and *Heart*, and helpeth *Digestion*. Certainly this *Berry Coffee*, the *Root* and *Leaf Betel*, the *Leaf Tobacco*, and the *Tear* of *Poppy*, (*Opium*) of which the *Turks* are great *Takers* (supposing it expelleth all fear;) do all condense the *Spirits*, and make them strong and *Alegre*. But it seemeth they are taken after several manners; for *Coffee* and *Opium* are taken down, *Tobacco* but in *Smoke*, and *Betel* is but champed in the *Mouth* with a little *Lime*. It is like there are more of them, if they were well found out, and well corrected. *Quare* of *Henbane-seed*; of *Mandrake*; of *Saffron*, *Root* and *Flower*; of *Folium Indum*; of *Ambergreece*; of the *Affyrian Anomum*, if it may be had; and of the *Scarlet Powder* which they call *Kermex*; and (generally) of all such things as do inebriate and provoke *Sleep*. Note that *Tobacco* is not taken in *Root* or *Seed*, which are more forcible ever then *Leaves*.

Experiment
Solitary touching
Medicines that
Condense and
Relieve the
Spirits.

738

THE *Turks* have a *Black Powder* made of a *Mineral* called *Alchole*, which with a fine long *Pencil* they lay under their *Eie-lids*, which doth colour them black, whereby the *White* of the *Eie* is set off more *white*. With the same *Powder* they colour also the *Hairs* of their *Eie-lids*, and of their *Eie-brows*, which they draw into embowed *Arches*. You shall finde that *Xenophon* maketh mention, that the *Medes* used to paint their *Eies*. The *Turks* use with the same *Tincture* to colour the *Hair* of their *Heads* and *Beards* black: And divers with us that are grown *Gray*, and yet would appear *Young*, finde means to make their *Hair* black, by combing it (as they say) with a *Leaden Comb*, or the like. As for the *Chineses*, who are of an ill *Complexion*, (being *Olivaster*) they paint their *Cheeks* *Scarlet*, especially their *King* and *Grandees*. Generally, *Barbarous People*, that go naked,

Experiment
Solitary touching
Paintings of the
Body.

739

naked, do not onely paint themselves, but they pounce and rase their skin, that the *Painting* may not be taken forth, and make it into Works. So doe the *West Indians*; and so did the ancient *Picts* and *Britons*: so that it seemeth *Men* would have the *Colours* of *Birds Feathers*, if they could tell how; or at least they will have *Gay Skins* in stead of *Gay Clothes*.

Experiment
Solitary tou-
ching the use
of Bathing and
Anointing.

740

IT is strange that the use of *Bathing* as a part of *Diet* is left. With the *Romans* and the *Grecians* it was as usual as *Eating* or *Sleeping*; and so is it amongst the *Turks* at this day: whereas with us it remaineth but as a *Part* of *Physick*. I am of opinion that the use of it as it was with the *Romans* was hurtful to *Health*; for that it made the *Body* soft and easie to waste. For the *Turks* it is more proper, because their *Drinking Water*, and *Feeding* upon *Rice*, and other Food of small nourishment, maketh their *Bodies* so solid and hard as you need not fear that *Bathing* should make them *Frothy*. Besides, the *Turks* are great *Sitters*, and seldom walk; whereby they sweat less, and need *Bathing* more. But yet certain it is, that *Bathing*, and especially *Anointing*, may be so used, as it may be a great help to *Health*, and *Prolongation of Life*. But hereof we shall speak in due place, when we come to handle *Experiments Medicinal*.

Experiment
Solitary tou-
ching Chamo-
letting of Paper.

741

THE *Turks* have a pretty Art of *Chamoletting* of *Paper*; which is not with us in use. They take divers *Oiled Colours*, and put them severally (in drops) upon *Water*, and stirre the *Water* lightly, and then wet their *Paper* (being of some thickness) with it; and the *Paper* will be *Waved* and *Veined* like *Chamolet* or *Marble*.

Experiment
Solitary tou-
ching Cuttle-
Ink.

742

IT is somewhat strange that the *Blond* of all *Birds*, and *Beasts*, and *Fishes*, should be of a *red Colour*, and onely the *Blond* of the *Cuttle* should be as *Black* as *Ink*. A man would think that the *Cause* should be the *high Concoction* of that *Blond*; for we see in ordinary *Puddings*, that the *Boiling* turneth the *Blond* to be *Black*: and the *Cuttle* is accounted a delicate *Mear*, and is much in request.

Experiment
Solitary tou-
ching Encrease
of Weight in
Earth.

743

IT is reported of credit, that if you take *Earth* from land adjoining to the *River* of *Nile*, and preserve it in that manner that it neither come to be wet nor wasted, and weigh it daily, it will not alter *Weights* until the seventeenth of *June*, which is the Day when the *River* beginneth to rise; and then it will grow more and more *Ponderous* till the *River* cometh to his height. Which if it be true, it cannot be caused but by the *Aire*, which then beginneth to condense; and so turneth within that small *Mould* into a degree of *Moisture*, which produceth *Weight*. So it hath been observed, that *Tobacco* Cut and Weighed, and then Dried by the *Fire*, loseth *Weight*; and after being laid in the open *Aire*, recovereth *Weight* again. And it should seem, that as soon as ever the *River* beginneth to increase, the whole *Body* of the *Aire* thereabouts suffereth a Change: For (that which is more strange) it is credibly affirmed, that upon that very Day, when the *River* first riseth, great *Plagues* in *Cairo* use suddenly to break up.

Experiments
in Comfort
touching Sleep.

744

THose that are very *Cold*, and especially in their *Feet*, cannot get to *Sleep*. The *Cause* may be, for that in *Sleep* is required a *Free Respiration*, which *Cold* doth shut in and hinder: For we see that in great *Colds* one can scarce draw

draw his *Breath*. Another *Cause* may be, for that *Cold* calleth the *Spirits* to succour, and therefore they cannot so well close, and go together in the *Head*, which is ever requisite to *Sleep*. And for the same *Cause*, *Pain* and *Noise* hinder *Sleep*, and *Darkness* (contrariwise) furthereth *Sleep*.

Some *Noises* (whereof we spake in the 112 *Experiment*) help *Sleep*; as the blowing of the *Wind*, the trickling of *Water*, humming of *Bees*, soft *Singing*, *Reading*, &c. The *Cause* is, for that they move in the *Spirits* a gentle attention; and whatsoever moveth attention, without too much labour, stilleth the natural and discursive *Motion* of the *Spirits*.

Sleep nourisheth, or at least preserveth, *Bodies* a long time, without other Nourishment. *Beasts* that sleep in *Winter*, (as it is noted of *wild Bears*) during their *sleep* wax very fat, though they eat nothing. *Bats* have been found in *Ovens*, and other hollow close places, Matted one upon another; and therefore it is likely that they sleep in the *Winter* time, and eat nothing. *Quare* whether *Bees* do not sleep all *Winter*, and spare their *Honey*. *Butterflies*, and other *Flies*, do not onely *sleep*, but lie as dead all *Winter*; and yet with a little heat of *Sun* or *Fire* revive again. A *Dormouse* both *Winter* and *Summer* will *sleep* some days together, and eat nothing.

To restore *Teeth* in *Age*, were *Magnale Natura*. It may be thought of. But howsoever, the *Nature* of the *Teeth* deserveth to be enquired of, as well as the other *Parts* of *Living Creature's Bodies*.

Experiments in
Confort touch-
ing *Teeth* and
hard *Substances*
in the *Bodies* of
*Living Crea-
tures*.

There be five parts in the *Bodies* of *Living Creatures* that are of hard *Substances*; the *Skull*, the *Teeth*, the *Bones*, the *Horns*, and the *Nails*. The greatest quantity of hard substance continued, is towards the *Head*: For there is the *Skull* of one entire *Bone*, there are the *Teeth*, there are *Maxillary Bones*, there is the *hard Bone* that is the *Instrument* of *Hearing*, and thence issue the *Horns*. So that the building of *living Creatures Bodies* is like the building of a *Timber-house*, where the *Walls* and other parts have *Columns* and *Beams*; but the *Roof* is in the better sort of *Houses* all *Tile*, or *Lead*, or *Stone*. As for *Birds*, they have three other hard *Substances* proper to them; the *Bill*, which is of the like Matter with the *Teeth*, for no *Birds* have *Teeth*; the *Shell* of the *Egg*; and their *Quills*: for as for their *Spur*, it is but a *Nail*. But no *living Creatures* that have *Shells* very hard (as *Oysters*, *Cockles*, *Mussels*, *Shalops*, *Crabs*, *Lobsters*, *Craw-fish*, *Shrimps*, and especially the *Tortoise*) have *Bones* within them, but onely little *Gristles*.

Bones, after full growth, continue at a stay, and so doth the *Skull*: *Horns*, in some *Creatures*, are Cast and Renewed: *Teeth* stand at a stay, except their wearing. As for *Nails*, they grow continually: and *Bills* and *Beaks* will over-grow, and sometimes be Cast, as in *Eagles* and *Parrots*.

Most of the hard *Substances* flie to the *Extremes* of the *Body*; as *Skull*, *Horns*, *Teeth*, *Nails*, and *Beaks*: onely the *Bones* are more inward, and clad with *Flesh*. As for the *Entrails*, they are all without *Bones*, save that a *Bone* is sometimes found in the *Heart* of a *Stag*; and it may be in some other *Creatures*.

The *Skull* hath *Brains*, as a kind of *Marrow*, within it. The *Back-bone* hath one kind of *Marrow*, which hath an affinity with the *Brain*; and other *Bones* of the *Body* have another. The *Faw-bones* have no *Marrow* sever'd, but a little *Pulp* of *Marrow* diffus'd. *Teeth* likewise are thought to

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have a kind of *Marrow* diffused, which causeth the *Sense* and *Pain*: But it is rather *Sinew*; for *Marrow* hath no *Sense*, no more then *Blond*. *Horn* is alike throughout, and so is the *Nail*.

751 None other of the *Hard Substances* have *Sense* but the *Teeth*: and the *Teeth* have *Sense*, not onely of *Pain*, but of *Cold*.

But we will leave the Enquiries of other *Hard Substances* unto their several places, and now enquire onely of the *Teeth*.

752 The *Teeth* are, in *Men*, of three Kinds: *Sharp*, as the *Fore-teeth*; *Broad*, as the *Back-teeth*, which we call the *Molar-teeth*, or *Grinders*; and *Pointed-teeth*, or *Canine*, which are between both. But there have been some *Men* that have had their *Teeth* undivided, as of one whole *Bone*, with some little *Mark* in the place of the *Division*; as *Pyrrhus* had. Some *Creatures* have *Over-long* or *Out-growing Teeth*, which we call *Fangs* or *Tusks*; as *Boars*, *Pikes*, *Salmons*, and *Dogs*, though less. Some *Living Creatures* have *Teeth* against *Teeth*, as *Men* and *Horses*; and some have *Teeth*, especially their *Master-teeth*, indented one within another like *Saws*, as *Lions*; and so again have *Dogs*. Some *Fishes* have divers *Rows of Teeth* in the *Roofs* of their *Mouths*; as *Pikes*, *Salmons*, *Trouts*, &c. and many more in *Salt-waters*. *Snakes* and other *Serpents* have *venemous Teeth*, which are sometimes mistaken for their *Sting*.

753 No *Beast* that hath *Horns* hath *Upper-teeth*; and no *Beast* that hath *Teeth* above, wanteth them below. But yet if they be of the same kind, it followeth not, that if the *Hard Matter* goeth not into *Upper-teeth*, it will go into *Horns*; nor yet *à converso*, for *Does*, that have no *Horns*, have no *Upper-teeth*.

754 *Horses* have, at three years old, a *Tooth* put forth which they call the *Colts-tooth*; and at four years old there cometh the *Mark-tooth*, which hath a *Hole* so big as you may lay a *Pease* within it: and that weareth shorter and shorter every year, till that at eight years old the *Tooth* is smooth, and the *hole* gone; and then they say, that the *Mark* is out of the *Horse's Mouth*.

755 The *Teeth* of *Men* breed first, when the *Child* is about a year and half old: and then they cast them, and new come about seven years old. But divers have *Backward teeth* come forth at twenty, yea, some at thirty, and forty. *Quare* of the manner of the coming of them forth. They tell a tale of the old *Countess* of *Desmond*, who lived till she was *sevenscore* years old, that she did *Dentire* twice or thrice, casting her old *Teeth*, and others coming in their place.

756 *Teeth* are much hurt by *Sweet-meats*, and by *Painting* with *Mercury*, and by things over-hot, and by things over-cold, and by *Rheums*. And the pain of the *Teeth* is one of the sharpest of *Pains*.

757 Concerning *Teeth* these things are to be consider'd. 1. The *Preserving* of them. 2. The *Keeping* of them *White*. 3. The *Drawing* of them with least *Pain*. 4. The *Staying* and *Easing* of the *Tooth-ach*. 5. The *Binding* in of *Artificial Teeth*, where *Teeth* have been stricken out. 6. And last of all, that *Great One*, of *Restoring Teeth* in *Age*. The instances that give any likelihood of *Restoring Teeth* in *Age*, are, the late coming of *Teeth* in some, and the *Renewing* of the *Beaks* in *Birds*, which are *Commateral* with *Teeth*. *Quare* therefore more particularly how that cometh. And again, the *Renewing* of *Horns*. But yet that hath not been known to have been provoked by *Art*; therefore let *trial* be made, whether *Horns* may be procured to grow in *Beasts* that are not *Horned*, and how; and whether they

they may be procured to come *larger* then usual, as to make an *Ox* or a *Deer* have a greater *head* of *Horns*; and whether the *head* of a *Deer*, that by age is more *Spitted*, may be brought again to be more *Branched*. For these *Trials* and the like will shew, whether by *Art* such *hard matter* can be called and provoked. It may be tried also whether *Birds* may not have something done to them when they are *young*, whereby they may be made to have *greater* or *longer Bills*, or *greater* and *longer Talons*: And whether *Children* may not have some *Wash*, or something to make their *Teeth* better and stronger. *Coral* is in use as an help to the *Teeth* of *Children*.

SOME *living creatures* Generate but at certain *Seasons* of the year; as *Deer*, *Sheep*, *Wild Coneyes*, &c. and most sorts of *Birds* and *Fishes*: Others at any time of the year, as *Men*; and all *Domestick creatures*, as *Horses*, *Hogs*, *Dogs*, *Cats*, &c. The cause of *Generation* at all seasons seemeth to be *Fulness*; for *Generation* is from *Redundance*. This *Fulness* ariseth from two causes: either from the *Nature* of the *Creature*, if it be *Hot*, and *Moist*, and *Sanguin*; or from *Plenty* of *Food*. For the first, *Men*, *Horses*, *Dogs*, &c. which breed at all *Seasons*, are full of *Heat* and *Moisture*; *Doves* are the fullest of *Heat* and *Moisture* amongst *Birds*, and therefore breed often, the *Tame Dove* almost continually. But *Deer* are a *melancholick drie Creature*, as appeareth by their *Fearfulness*, and the *hardness* of their *flesh*. *Sheep* are a *cold Creature*, as appeareth by their *Mildness*, and for that they seldom drink. Most sorts of *Birds* are of a *drie substance* in comparison of *Beasts*. *Fishes* are cold. For the second Cause, *Fulness* of *Food*, *Men*, *Kine*, *Swine*, *Dogs*, &c. feed full. And we see that those *Creatures* which, being *Wilde*, generate seldom, being *Tame*, generate often; which is from *warmth* and *fulness* of *food*. We find that the time of going to *Rut* of *Deer* is in *September*, for that they need the whole *Summer's* Feed and grafs to make them fit for *Generation*: and if *Rain* come early about the middle of *September*, they go to *Rut* somewhat the sooner; if *Drought*, somewhat the later. So *Sheep*, in respect of their small *heat*, generate about the same time, or somewhat before. But for the most part, *Creatures* that generate at certain *Seasons* generate in the *Spring*; as *Birds* and *Fishes*: for that the *End* of the *Winter*, and the *Heat* and *Comfort* of the *Spring* prepareth them. There is also another reason why some *Creatures* generate at certain *Seasons*, and that is the *Relation* of their time of *Bearing* to the time of *Generation*; for no *Creature* goeth to generate whilst the *Female* is full, nor whilst she is busie in *Sitting*, or *Rearing* her *Young*: and therefore it is found by *Experience*, that if you take the *Eggs* or *Young ones* out of the *Nests* of *Birds*, they will fall to generate again three or four times one after another.

Of *living Creatures*, some are longer time in the *Womb*, and some shorter. *Women* go commonly nine months, the *Cow* and the *Ewe* about six months, *Does* goe about nine months, *Mares* eleven months, *Bitches* nine weeks: *Elephants* are said to go two years; for the received *Tradition* of ten years is *Fabulous*. For *Birds* there is double Enquiry: the distance between the *Treading* or *Coupling*, and the *Laying* of the *Egg*; and again, between the *Egg Layed*, and the *Disloosing* or *Hatching*. And amongst *Birds* there is less diversity of *Time* then amongst other *Creatures*, yet some there is; for the *Hen* sitteth but three weeks, the *Turkey-hen*, *Goose* and *Duck*, a month. *Quare* of others. The cause of the great difference of *Times* amongst *living Creatures* is, either from the *Nature* of the *Kind*,

Experiments in
Consort touch-
ing the Gene-
ration and
Bearing of li-
ving Creatures
in the Womb.

758

759

or from the *Constitution* of the *Womb*. For the former, those that are longer in coming to their *maturity* or *growth*, are longer in the *Womb*; as is chiefly seen in *Men*: and so *Elephants*, which are long in the *Womb*, are long time in coming to their full *growth*. But in most other kinds, the *Constitution* of the *Womb* (that is, the *hardness* or *driness* thereof) is concurrent with the former *Cause*. For the *Colt* hath about four years of *growth*, and so the *Fawn*, and so the *Calf*; but *Whelps*, which come to their *growth* (commonly) within three quarters of a year, are but nine weeks in the *Womb*. As for *Birds*, as there is less diversity amongst them in the time of their *bringing forth*, so there is less diversity in the time of their *growth*, most of them coming to their *growth* within a twelve-month.

760

Some *Creatures* bring forth many young ones at a *Burthen*; as *Bitches*, *Hares*, *Coneys*, &c. some (ordinarily) but one; as *Women*, *Lionesses*, &c. This may be caused, either by the *quantity* of *Sperm* required to the *Producing* One of that Kind; which if less be required, may admit greater number; if more, fewer: or by the *Partitions* and *Cells* of the *Womb*, which may sever the *Sperm*.

Experiments in
Confort touch-
ing Species vi-
sible.

761

There is no doubt but *Light* by *Refraction* will shew greater, as well as *things coloured*: for like as a *Shilling* in the *bottom* of the *Water* will shew greater, so will a *Candle* in a *Lanthorn* in the *bottom* of the *Water*. I have heard of a practice, that *Glo-worms* in *Glasses* were put in the *Water* to make the *Fish* come. But I am not yet inform'd, whether when a *Diver* diveth, having his *Eyes* open, and swimmeth upon his *Back*, whether (I say) he seeth *things* in the *Air*, greater or less. For it is manifest, that when the *Eye* standeth in the *Finer Medium*, and the *Object* is in the *Grosser*, things shew greater: but contrariwise, when the *Eye* is placed in the *Grosser Medium*, and the *Object* in the *Finer*, how it worketh I know not.

762

It would be well boulded out, whether great *Refractions* may not be made upon *Reflexions*, as well as upon *Direct Beams*. For Example, We see, that take an *empty Bason*, put an *Angel* of *Gold* or what you will into it; then go so far from the *Bason* till you cannot see the *Angel*, because it is not in a *right line*; then fill the *Bason* with *Water*, and you shall see it out of his place, because of the *reflexion*. To proceed therefore, put a *Looking-glass* into a *Bason* of *Water*; I suppose you shall not see the *Image* in a *right line*, or at *equal angles*, but aside. I know not whether this *Experiment* may not be extended so, as you might see the *Image*, and not the *Glass*: which for *beauty* and *strangeness* were a fine proof, for then you shall see the *Image* like a *Spirit* in the *Air*. As for Example, If there be a *Cistern* or *Pool* of *Water*, you shall place over against it a picture of the *Devil*, or what you will, so as you do not see the *Water*; then put a *Looking-glass* in the *Water*: Now if you can see the *Devil's* picture aside, not seeing the *Water*, it will look like a *Devil* indeed. They have an old Tale in *Oxford*, that *Friar Bacon* walked between two *Steeple*s: which was thought to be done by *Glasses*, when he walked upon the *Ground*.

Experiments in
Confort touch-
ing the Impul-
sion and Per-
cussion.

763

A *Weighty Body* put into *Motion* is more easily impelled then at first when it *Resteth*. The *cause* is, partly because *Motion* doth discuss the *Tor-pour* of *Solid Bodies*, which beside their *motion* of *Gravity*, have in them a *Natural Appetite* not to move at all; and partly, because a *Body* that resteth doth get, by the *resistance* of the *Body* upon which it resteth, a stronger

Com-

compression of *parts* then it hath of it self, and therefore needeth more force to be put in *motion*. For if a *weighty Body* be *pensile*, and hang but by a *thrid*, the *percussion* will make an *impulsion* very near as easily as if it were already in *motion*.

A *Body over-great* or *over-small* will not be thrown so far as a *Body* of a *middle size*; so that (it seemeth) there must be a *commensuration* or *proportion* between the *Body moved* and the *force*, to make it move well. The *cause* is, because to the *Impulsion* there is requisite the *force* of the *Body* that *moveth*, and the *resistance* of the *Body* that is *moved*: and if the *Body* be *too great*, it yieldeth too little; and if it be *too small*, it resisteth too little.

764

It is *common Experience*, that no *Weight* will press or cut so strong being laid upon a *Body*, as falling or stricken from above. It may be the *Air* hath some part in furthering the *percussion*: but the chief *cause* I take to be, for that the *parts* of the *Body moved* have by *impulsion*, or by the *motion* of *Gravity continued*, a *compression* in them as well downwards, as they have when they are thrown or shot through the *Air* forwards. I conceive also, that the quick loose of that *motion* preventeth the *resistance* of the *Body* below; and *priority* of the *force* (always) is of great *efficacy*, as appeareth in infinite *Instances*.

765

Tickling is most in the *soles* of the *feet*, and under the *arm-holes*, and on the *sides*. The *cause* is, the *thinness* of the *skin* in those *parts*, joyned with the *rareness* of being touched there; for all *Tickling* is a light *motion* of the *Spirits*, which the *thinness* of the *skin*, and *suddenness* and *rareness* of *touch* do further: for we see, a *Feather* or a *Rush* drawn along the *lip* or *cheek* doth *tickle*; whereas a *thing* more *obtus*, or a *touch* more *hard*, doth not: And for *Suddenness*, we see no *man* can *tickle* himself. We see also that the *palm* of the *hand*, though it hath as *thin* a *skin* as the other *parts* mention'd, yet is not *ticklish*, because it is accustomed to be touched. *Tickling* also causeth *Laughter*. The *cause* may be the *emission* of the *Spirits*, and so of the *Breath*, by a *flight* from *Titillation*; for upon *Tickling*, we see there is ever a *starting* or *shrinking* away of the *part* to avoid it; and we see also, that if you *tickle* the *Nostrils* with a *Feather* or *Straw*, it procureth *Sneezing*, which is a sudden *emission* of the *spirits*, that do likewise expel the *moisture*. And *tickling* is ever painful, and not well endured.

Experiment
Solitary touch-
ing *Titillation*.

766

It is strange, that the *River* of *Nilus* overflowing, as it doth, the *Country* of *Agypt*, there should be nevertheless little or no *Rain* in that *Country*. The *cause* must be, either in the *Nature* of the *Water*, or in the *Nature* of the *Air*, or of both. In the *Water*, it may be ascribed either unto the *long race* of the *Water*, for *swift-running Waters* vapour not so much as *standing Waters*: or else to the *concoction* of the *Water*, for *Waters* well *concocted* vapour not so much as *Waters* raw, no more then *Waters* upon the *fire* do vapour so much, after some time of *Boiling*, as at the first. And it is true, that the *Water* of *Nilus* is sweeter then other *Waters* in taste: and it is excellent good for the *Stone*, and *Hypochondriacal Melancholy*, which sheweth it is *lenifying*; and it runneth through a *Country* of a *hot Climate*, and flat, without shade either of *Woods* or *Hills*, whereby the *Sun* must needs have great power to *concoct* it. As for the *Air* (from whence I conceive this want of *Showers* cometh chiefly) the *cause*

Experiment
Solitary touch-
ing the scarcity
of *Rain* in
Agypt.

767

must be, for that the *Air* is of it self *Thin* and *Thirsty*, and as soon as ever it getteth any moisture from the *Water*, it imbibeth, and dissipateth it in the whole *Body* of the *Air*, and suffereth it not to remain in *Vapour*, whereby it might breed *Rain*.

Experiment
Solitary touch-
ing Clarifica-
tion.

768

IT hath been touched in the *Title of Perlocutions*, (namely, such as are *inwards*) that the *Whites* of *Eggs* and *Milk* do clarify: and it is certain that in *Egypt* they prepare and clarify the *Water of Nile*, by putting it into great *Fars* of *Stone*, and stirring it about with a few stamped *Almonds*, wherewith they also besmear the mouth of the *Vessel*; and so draw it off, after it hath rested some time. It were good to trie this *Clarifying* with *Almonds* in *New Beer* or *Must*, to hasten and perfect the *Clarifying*.

Experiment
Solitary touch-
ing *Plants*
without *Leaves*.

769

THEre be scarce to be found any *Vegetables* that have *Branches* and no *Leaves*, except you allow *Coral* for one. But there is also in the *Desarts* of *S. Macario* in *Egypt* a *Plant* which is long, *Leafless*, brown of colour, and branched like *Coral*, save that it closeth at the *top*: This being set in *water* within *house* spreadeth and displayeth strangely; and the *People* thereabout have a superstitious belief, that in the *Labour* of *Women* it helpeth to the *easie Deliverance*.

Experiment
Solitary touch-
ing the *Mate-
rials* of *Glass*.

770

THE *Crystalline Venice-Glass* is reported to be a mixture, in equal portions, of *Stones* brought from *Pavia* by the *River Ticinum*, and the *Ashes* of a *Weed* called by the *Arabs*, *Kull*, which is gathered in a *Desart* between *Alexandria* and *Rosetta*; and is by the *Egyptians* used first for *Fuel*, and then they crush the *Ashes* into lumps like a *Stone*, and so sell them to the *Venetians* for their *Glass-works*.

Experiment
Solitary touch-
ing *Prohibition*
of *Putrefaction*,
and the long
conservation of
Bodies.

771

IT is strange, and well to be noted, how long *Carcasses* have continued *uncorrupt*, and in their former *Dimensions*; as appeareth in the *Mummies* of *Egypt*, having lasted, as is conceived, (some of them) three thousand years. It is true, they find means to draw forth the *Brains*, and to take forth the *Entrails*, which are the *parts* aptest to corrupt. But that is nothing to the *Wonder*; for we see what a soft and corruptible *Substance* the *Flesh* of all the other *parts* of the *Body* is. But it should seem, that according to our *Observation* and *Axiom*, in our hundredth *Experiments*, *Putrefaction*, which we conceive to be so *natural* a *Period* of *Bodies*, is but an *Accident*, and that *Matter* maketh not that haste to *Corruption* that is conceived; and therefore *Bodies* in *shining Amber*, in *Quick-silver*, in *Balms*, (whereof we now speak) in *Wax*, in *Hony*, in *Gums*, and (it may be) in *Conservatives* of *Snow*, &c. are preserved very long. It need not go for *Repetition*; if we resume again that which we said in the afore-said *Experiments* concerning *Annihilation*, namely, that if you provide against three *Causes* of *Putrefaction*, *Bodies* will not corrupt. The first is, that the *Air* be excluded; for that undermineth the *Body*, and conspireth with the *Spirit* of the *Body* to dissolve it. The second is, that the *Body* adjacent and ambient be not *Com-material*, but metely *Heterogeneous* towards the *Body* that is to be preserved; for if nothing can be received by the one, nothing can issue from the other: such are *Quick-silver* and *white Amber* to *Herbs* and *Fishes*, and such *Bodies*. The third is, that the *Body* to be preserved be not of that *Gross* that it may corrupt within it self, although no part of it issue into the *Body* adjacent; and therefore it must be rather *Thin* and

and *Small* then of *Bulk*. There is a fourth Remedy also, which is, That if the *Body* to be preserved be of *bulk*, as a *Corps* is, then the *Body* that incloseth it must have a virtue to draw forth and drie the *moisture* of the *inward Body*; for else the *Putrefaction* will play within, though nothing issue forth. I remember *Livy* doth relate, that there were found at a time two *Coffins* of *Lead* in a *Tomb*, whereof the one contained the *Body* of King *Numa*, it being some four hundred years after his death; and the other, his *Books* of *Sacred Rites* and *Ceremonies*, and the *Discipline* of the *Pontiffs*: and that in the *Coffin* that had the *Body* there was nothing (at all) to be seen but a little light *Cinders* about the *sides*; but in the *Coffin* that had the *Books*, they were found as fresh as if they had been but newly written, being written in *Parchment*, and covered over with *Wach-candles* of *Wax* three or four fold. By this it seemeth, that the *Romans* in *Numa's* time were not so good *Embalmers* as the *Egyptians* were; which was the cause that the *Body* was utterly consumed. But I find in *Plutarch* and others, that when *Augustus Caesar* visited the *Sepulcher* of *Alexander the Great* in *Alexandria*, he found the *Body* to keep his *Dimension*; but withal, that notwithstanding all the *Embalming* (which no doubt was of the best) the *Body* was so tender, as *Cesar* touching but the *Nose* of it defac'd it. Which maketh me find it very strange, that the *Egyptian Mummies* should be reported to be as hard as *Stone-pitch*: for I find no difference but one, which indeed may be very material; namely, that the ancient *Egyptian Mummies* were shrowded in a number of folds of *Linnen*, besmeared with *Gums*, in manner of *Sear-cloth*; which it doth not appear was practised upon the *Body* of *Alexander*.

Near the *Castle* of *Catie*, and by the *Wells Assan*, in the *Land* of *Idumaea*, a great part of the way you would think the *Sea* were near hand, though it be a good distance of: And it is nothing but the *shining* of the *Nitre* upon the *Sea-sands*; such abundance of *Nitre* the *Shores* there do put forth.

Experiment
Solitary touch-
ing the Abun-
dance of *Nitre*
in certain *Sea-*
shores.

772

The *Dead Sea*, which vomiteth up *Bitumen*, is of that *Crafsitude*, as living *Bodies* bound hand and foot and cast into it have been born up and not sunk: Which sheweth, that all sinking into *Water* is but an *Overweight* of the *Body* put into the *Water* in respect of the *Water*; so that you may make *Water* so strong and heavy of *Quick-silver*, (perhaps) or the like, as may bear up *Iron*: of which I see no use, but *Imposture*. We see also that all *Metalls*, except *Gold*, for the same reason swim upon *Quick-silver*.

Experiment
Solitary touch-
ing *Bodies* that
are born up by
water.

773

It is reported, that at the *foot* of a *Hill* near the *Mare mortuum*, there is a *black Stone* (whereof *Pilgrims* make *Fires*) which burneth like a *Coal*, and diminisheth not, but onely waxeth brighter and whiter. That it should doe so is not strange; for we see *Iron* red hot burneth and consumeth not. But the *Strangeness* is, that it should continue any time so; for *Iron*, as soon as it is out of the *Fire*, deadeth straight-ways. Certainly it were a thing of great use and profit; if you could find out *Fuel* that would burn hot; and yet last long: neither am I altogether incredulous, but there may be such *Candles* as (they say) are made of *Salamanders Wool*, being a kind of *Mineral* which whiteneth also in the burning, and consumeth not. The *Question* is this, *Flame* must be made of somewhat; and commonly it

Experiment
Solitary touch-
ing *Fuel* that
consumeth little
or nothing.

774

is made of some *tangible Body* which hath *weight*; but it is not impossible, perhaps, that it should be made of *Spirit* or *Vapour* in a *Body*, (which *Spirit* or *Vapour* hath no *weight*) such as is the matter of *Ignis fatuus*. But then you will say that that *Vapour* also can last but a short time. To that it may be answered, That by the help of *Oil*, and *Wax*, and other *Candle-stuff*, the *Flame* may continue, and the *Wick* not burnt.

Experiment
Solitary Occo-
nomical touch-
ing cheap
Fuel.

775

Sea-coal last longer then *Char-coal*; and *Char-coal* of *Roots*, being coaled into great Pieces, last longer then ordinary *Char-coal*. *Turf*, and *Peat*, and *Cow-sheats* are cheap *Fuels*, and last long. *Small-coal* or *Char-coal* poured upon *Char-coal* make them last longer. *Sedge* is a cheap *Fuel* to Brew or Bake with, the rather, because it is good for nothing else. Trial would be made of some mixture of *Sea-coal* with *Earth*, or *Chalk*: for if that mixture be, as the *Sea-coal-men* use it privily, to make the Bulk of the *Coal* greater, it is deceit; but if it be used purposely, and be made known, it is saving.

Experiment
Solitary touch-
ing the gather-
ing of Wind
for Freshness.

776

IT is at this day in use in *Gaza*, to couch *Pot-sheats* or *Vessels* of *Earth* in their *Walls*, to gather the *Wind* from the top, and to pass it down in Spouts into *Rooms*. It is a device for *Freshness* in great Heats. And it is said, there are some *Rooms* in *Italy* and *Spain* for *Freshness*, and gathering the *Winds* and *Air* in the Heats of *Summer*: but they be but *Pennings* of the *Winds*, and *Enlarging* them again, and making them *reverberate*, and go round in *Circles*, rather then this device of *Spouts* in the *Wall*.

Experiment
Solitary touch-
ing the Trials
of Airs.

777

THere would be used much diligence in the choice of some *Bodies* and *Places* (as it were) for the *tasting* of *Air*, to discover the *wholesomeness* or *unwholesomeness* as well of *Seasons* as of the *Seats* of *Dwellings*. It is certain that there be some *Houses* wherein *Constitures* and *Pies* will gather *Mould* more then in others; and I am perswaded that a *piece* of *raw Flesh* or *Fish* will sooner corrupt in some *Airs* then in others. They be noble *Experiments* that can make this *discovery*; for they serve for a *Natural Divination* of *Seasons*, better then the *Astronomers* can by their *Figures*: and again, they teach men where to chuse their *dwelling* for their better *health*.

Experiment
Solitary touch-
ing increasing
of Milk in
Milk-Beasts.

778

THere is a kind of *Stone* about *Bethlehem* which they grind to *powder*, and put into *water*, whereof *Cattel* drink, which maketh them give more *Milk*. Surely there would be some better *Trials* made of *Mixtures* of *Water* in *Ponds* for *Cattel*, to make them more *Milch*, or to *Fatten* them, or to keep them from *Murrain*. It may be, *Chalk* and *Nitre* are of the best.

Experiment
Solitary touch-
ing Sand of the
nature of Glass.

779

IT is reported, that in the *Valley* near the *Mountain Carmel* in *Judea* there is a *Sand* which of all other hath most affinity with *Glass*, inasmuch as other *Minerals* laid in it turn to a *Glassie Substance*, without the *Fire*: and again, *Glass* put into it turneth into the *Mother-sand*. The thing is very strange, if it be true; and it is likeliest to be caused by some *natural Furnace of Heat* in the *Earth*: and yet they do not speak of any *Eruption of Flames*. It were good to trie in *Glass-works*, whether the *crude Materials* of *Glass* mingled with *Glass* already made and re-moulden, do not facilitate the *making* of *Glass* with less *heat*.

IN the Sea upon the South-West of Sicily, much Coral is found. It is a *Submarine Plant*, it hath no leaves, it brancheth onely when it is under Water: it is soft, and green of colour: but being brought into the Air, it becometh hard, and shining red, as we see. It is said also to have a *white Berry*: but we find it not brought over with the Coral: belike it is cast away as nothing worth. Inquire better of it, for the discovery of the Nature of the Plant.

Experiment
Solitary touch-
ing the growth
of Coral.

780

THe Manna of Calabria is the best, and in most plenty. They gather it from the Leaf of the Mulberry-tree; but not of such Mulberry-trees as grow in the Valleys: and Manna falleth upon the Leaves by night, as other Dews do. It should seem, that before those Dews come upon Trees in the Valleys, they dissipate and cannot hold out. It should seem also, the Mulberry-leaf it self hath some Coagulating Virtue, which inspissateth the Dew, for that it is not found upon other Trees: And we see by the Silk-worm, which feedeth upon that Leaf, what a dainty smooth juice it hath; and the Leaves also (especially of the black Mulberry) are somewhat bristly, which may help to preserve the Dew. Certainly, it were not amiss to observe a little better the Dews that fall upon Trees or Herbs growing on Mountains; for it may be, many Dews fall that spend before they come to the Valleys. And I suppose that he that would gather the best May-Dew for Medicine, should gather it from the Hills.

Experiment
Solitary touch-
ing the Gather-
ing of Manna.

781

IT is said, they have a manner to prepare their Greek Wines, to keep them from Fuming and Inebriating, by adding some Sulphur or Allom; where- of the one is *Uncituous*, and the other is *Astringent*. And certain it is, that those two Natures do repress the Fumes. This Experiment would be trans- ferred unto other Wine and Strong Beer, by putting in some like Substances while they work; which may make them both to Fume less and to Inflame less.

Experiment
Solitary touch-
ing the Corre-
cting of Wine.

782

IT is conceived by some, (not improbably) that the reason why Wild- fires (whereof the principal Ingredient is Bitumen) do not quench with Water, is; for that the first concretion of Bitumen is a mixture of a Fiery and Watry Substance; so is not Sulphur. This appeareth, for that in the place near Puteoli, which they call the Court of Vulcan, you shall hear under the Earth a horrible thundring of Fire and Water conflicting toge- ther; and there break forth also Spouts of boiling Water. Now that place yieldeth great quantities of Bitumen: whereas Aetna, and Vesuvius, and the like, which consist upon Sulphur, shoot forth Smoak, and Ashes, and Pumice, but no Water. It is reported also, that Bitumen mingled with Lime, and put under Water, will make, as it were, an artificial Rock; the Substance be- cometh so hard.

Experiment
Solitary touch-
ing the Ma'cri-
als of Wild-
fire.

783

THERE is a Cement compounded of Flower, Whites of Eggs; and Stone powdered; that becometh hard as Marble, wherewith Piscina Mirabilis, near Cuma, is said to have the Walls plaistered. And it is certain, and tried, that the Powder of Load-stone and Flint, by the addition of Whites of Eggs and Gum-dragon, made into Paste, will in a few days harden to the hardness of a Stone.

Experiment
Solitary touch-
ing Plaster
growing as hard
as Marble.

784

Experiment
Solitary touch-
ing judgment of
the Cure in
some Ulcers
and Hurts.

785

IT hath been noted by the *Ancients*, that in full or impure Bodies, Ulcers or hurts in the Legs are hard to cure, and in the Head more easie. The cause is, for that Ulcers or hurts in the Legs require Desiccation, which by the defluxion of humors to the lower parts is hindered; whereas hurts and Ulcers in the Head require it not; but, contrariwise, Driness maketh them more apt to Consolidate. And in modern observation the like difference hath been found between French-men and English-men; whereof the ones Constitution is more drie, and the others more moist: and therefore a hurt of the Head is harder to cure in a French-man, and of the Leg in an English-man.

Experiment
Solitary touch-
ing the Health-
fulness or Un-
healthfulness of
the Southern
wind.

786

IT hath been noted by the *Ancients*, that Southern Winds, blowing much without Rain, do cause a Feverous Disposition of the Year; but with Rain, not. The Cause is, for that Southern Winds do of themselves qualifie the Air to be apt to cause Fevers; but when Showers are joyned, they do Refrigerate in part, and check the Soultry Heat of the Southern Wind. Therefore this holdeth not in the Sea-Coasts, because the vapour of the Sea without Showers doth refresh.

Experiment
Solitary touch-
ing Wounds.

787

IT hath been noted by the *Ancients*, that Wounds which are made with Brass heal more easily then Wounds made with Iron. The Cause is, for that Brass hath in it self a Sanative virtue, and so in the very instant helpeth somewhat; but Iron is Corrosive, and not Sanative. And therefore it were good that the Instruments which are used by Chirurgions about Wounds were rather of Brass then Iron.

Experiment
Solitary touch-
ing Mortificati-
on by Cold.

788

IN the cold Countries, when mens Noses and Ears are mortifi'd, and (as it were) Gangren'd with cold, if they come to a Fire, they rot off presently. The cause is, for that the few Spirits that remain in those parts are suddenly drawn forth, and so Putrefaction is made complete. But Snow put upon them helpeth, for that it preserveth those Spirits that remain till they can revive: and besides, Snow hath in it a secret warmth, as the Monk proved out of the Text, *Qui dat Nivem sicut Lanam, Gelu sicut Cineres spargit*; whereby he did infer, that Snow did warm like Wool, and Frost did fret like Ashes. Warm water also doth good, because by little and little it openeth the pores, without any sudden working upon the Spirits. This Experiment may be transferred unto the Cure of Gangrenes, either coming of themselves, or induced by too much applying of Opiates: wherein you must beware of drie Heat, and resort to things that are Refrigerant, with an inward warmth and virtue of Cherishing.

Experiment
Solitary touch-
ing Weight.

789

WEigh Iron and Aqua-fortis severally; then dissolve the Iron in the Aqua-fortis, and weigh the Dissolution; and you shall find it to bear as good weight as the Bodies did severally, notwithstanding a good deal of waste by a thick vapour that issueth during the Working: which sheweth, that the opening of a Body doth increase the weight. This was tried once or twice, but I know not whether there were any Error in the Trial.

Experiment
Solitary touch-
ing the Super-
natation of
Bodies.

790

TAke of Aqua-fortis two Ounces, of Quick-silver two Drachms, (for that charge the Aqua-fortis will bear;) the Dissolution will not bear a Flint as big as a Nutmeg: yet (no doubt) the increasing of the weight of wa-
ter

ter will increase his *Power of Bearing*; as we see *Braine*, when it is salt enough, will bear an *Egg*. And I remember well a *Physician*, that used to give some *Mineral Baths* for the *Gout*, &c. And the *Body* when it was put into the *Bath*, could not get down so easily as in Ordinary *Water*. But it seemeth, the *weight* of the *Quick-silver* more then the *weight* of a *Stone*, doth not compensate the *weight* of a *Stone* more then the *weight* of the *Aqua-fortis*.

Let there be a *Body* of *unequal weight*, (as of *Wood* and *Lead*, or *Bone* and *Lead*;) if you throw it from you with the *light end* forward, it will turn, and the *weightier end* will recover to be forwards; unless the *Body* be over-long. The *Cause* is, for that the more *Dense Body* hath a more violent *Pressure* of the parts from the first *Impulsion*; which is the *Cause* (though heretofore not found out, as hath been often said) of all *Violent Motions*: And when the *hinder part* moveth swifter (for that it less endureth *Pressure* of *Parts*) then the *forward part* can make way for it, it must needs be that the *Body* turn over; for (turned) it can more easily draw forward the *lighter part*. *Galilaus* noteth it well, That if an *open Trough*, wherein *Water* is, be driven faster then the *Water* can follow, the *Water* gathereth upon an heap towards the *hinder end*, where the *Motion* began: which he supposeth (holding confidently the *Motion* of the *Earth*) to be the *Cause* of the *Ebbing* and *Flowing* of the *Ocean*, because the *Earth* over-runneeth the *Water*. Which *Theory* though it be false, yet the first *Experiment* is true. As for the *Inequality* of the *pressure* of parts, it appeareth manifestly in this, That if you take a *Body* of *Stone* or *Iron*, and another of *Wood*, of the same *magnitude* and *shape*, and throw them with equal force, you cannot possibly throw the *Wood* so far as the *Stone* or *Iron*.

Experiment
Solitary touch-
ing the Flying
of Unequal Bo-
dies in the Air.

791

It is certain (as it hath been formerly in part touched) that *Water* may be the *Medium* of *Sounds*: If you dash a *Stone* against a *Stone* in the bottom of the *Water*, it makes a *Sound*; so a long *Pole* struck upon *Gravel*, in the bottom of the *Water*, maketh a *Sound*. Nay, if you should think that the *Sound* cometh up by the *Pole*, and not by the *Water*, you shall find that an *Anchor* let down by a *Rope* maketh a *Sound*; and yet the *Rope* is no *Solid Body*, whereby the *Sound* can ascend.

Experiment
Solitary touch-
ing *Water*, that
it may be the
Medium of
Sounds.

792

All *Objects* of the *Senses* which are very *offensive* do cause the *Spirits* to retire; and upon their *flight*, the parts are (in some degree) destitute, and so there is induced in them a *trepidation* and *horror*. For *Sounds*, we see, that the *grating* of a *Saw*, or any very *harsh noise*, will set the *Teeth* on edge, and make all the *Body* shiver. For *Tastes*, we see, that in the taking of a *Potion*, or *Pills*, the *Head* and the *Neck* shake. For *odious Smells*, the like effect followeth, which is less perceived, because there is a *Remedy* at hand, by stopping of the *Nose*. But in *Horses*, that can use no such help, we see the smell of a *Carriou*, especially of a *dead Horse*, maketh them flee away, and take on almost as if they were mad. For *Feeling*, if you come out of the *Sun* suddenly into a *Shade*, there followeth a *chillness* or *shivering* in all the *Body*. And even in *Sight*, which hath (in effect) no *odious Object*, coming into sudden *Darkness* induceth an offer to *shiver*.

Experiment
Solitary of the
Flight of the
Spirits upon
Odious Objects.

793

There is in the *City* of *Ticinum* in *Italy*, a *Church* that hath *Windows* only from above; it is in *Length* an hundred Feet, in *Breadth* twenty Feet, and in *Height* near fifty, having a *Door* in the midst. It reporteth

Experiment
Solitary touch-
ing the Super-
Reflexion of
Echo's.

794

porteth the Voice twelve or thirteen times. If you stand by the close *End-wall* over against the *Door*, the *Echo* fadeth and dieth by little and little, as the *Echo* at *Pont-Charenton* doth; and the Voice soundeth as if it came from above the *Door*: and if you stand at the *lower end*, or on either *side* of the *Door*, the *Echo* holdeth: but if you stand in the *Door*, or in the *midst* just over against the *Door*, not. Note, that all *Echo's* sound better against *old Walls* then *new*, because they are more *drie* and *hollow*.

Experiment
Solitary touch-
ing the force of
Imagination,
imitating that
of the Sense.

795

THose Effects which are wrought by the *percussion* of the *sense*, and by *Things in Fact*, are produced likewise in some degree by the *Imagination*: therefore if a man see another eat *Sour* or *Acide things*, which set the *Teeth* on edge, this *object* tainteth the *Imagination*; so that he that seeth the *thing* done by another hath his own *Teeth* also set on edge. So if a man see another turn swiftly and long, or if he look upon *Wheels* that turn, himself waxeth *Turn-sick*. So if a man be upon a *high place*, without *Rails*, or good hold, except he be used to it, he is ready to fall; for *imagining* a *Fall*, it putteth his *Spirits* into the very *action* of a *Fall*. So many upon the *seeing* of others *Bleed*, or *Strangled*, or *Tortured*, themselves are ready to faint, as if they *bled*, or were in *strife*.

Experiment
Solitary touch-
ing Preservation
of Bodies.

796

TAKE a *Stock-Gillyflower* and tie it gently upon a stick, and put them both into a *Stoop-glass* full of *Quick-silver*, so that the *Flower* be covered; then lay a little *Weight* upon the top of the *Glass* that may keep the stick down: and look upon them after four or five days, and you shall find the *Flower* fresh, and the *Stalk* harder and less *flexible* then it was. If you compare it with another *Flower*, gathered at the same time, it will be the more manifest. This sheweth, that *Bodies* do preserve excellently in *Quick-silver*; and not preserve onely, but, by the *coldness* of the *Quick-silver*, *indurate*. For the *freshness* of the *Flower* may be merely *Conservation*; (which is the more to be observed, because the *Quick-silver* presseth the *Flower*) but the *stiffness* of the *Stalk* cannot be without *Induration* from the cold (as it seemeth) of the *Quick-silver*.

Experiment
Solitary touch-
ing the growth
or multiplying
of Metals.

797

IT is reported by some of the *Antients*, that in *Cyprus* there is a kind of *Iron*, that being cut into little *pieces* and put into the ground, if it be well *watered*, will encrease into *greater pieces*. This is certain, and known of old, that *Lead* will multiply and encrease: as hath been seen in old *Statues* of *Stone* which have been put in *Cellars*, the *feet* of them being bound with *Leaden bands*; where (after a time) there appeared that the *Lead* did swell, inso much as it hangeth upon the *Stone* like *Warts*.

Experiment
Solitary touch-
ing the drown-
ing of the more
Base Metall in
the more Pre-
cious.

798

I Call that *drowning* of *Metalls*, when the *Baser Metall* is so incorporate with the more *Rich*, as it can by no means be separated again; which is a kind of *Version*, though false: as if *Silver* should be inseparably incorporated with *Gold*, or *Copper* and *Lead* with *Silver*. The ancient *Electrum* had in it a fifth of *Silver* to the *Gold*, and made a *Compound Metall*, as fit for most uses as *Gold*, and more resplendent, and more qualifi'd in some other properties: but then that was easily separated. This to doe privily, or to make the *Compound* pass for the *Rich Metall Simple*, is an *Adulteration*, or *Counterfeiting*: but if it be done avowedly and without disguising, it may be a great saving of the *Richer Metall*. I remember to have heard of a man skilful in *Metalls*, that a *fifteenth* part of *Silver* incorporate with

Gold,

Gold will not be recovered by any *Water of Separation*, except you put a greater quantity of *Silver* to draw to it the less; which (he said) is the last refuge in *Separations*. But that is a tedious way, which no man (almost) will think on. This would be better enquired, and the quantity of the Fifteenth turned to a Twentieth; and likewise with some little *Additional*, that may further the *Intrinsic Incorporation*. Note that *Silver* in *Gold* will be detected by *Weight*, compared with the *Dimension*; but *Lead* in *Silver* (*Lead* being the *Weightier Metall*) will not be detected, if you take so much the more *Silver* as will countervail the *Over-weight* of the *Lead*.

Gold is the onely *Substance* which hath nothing in it *Volatile*, and yet melteth without much difficulty. The *Melting* sheweth that it is not jejune or scarce in *Spirit*. So that the *Fixing* of it is not want of *Spirit* to fly out, but the *Equal spreading* of the *Tangible Parts*, and the close *Coacervation* of them; whereby they have the less appetite, and no means (at all) to issue forth. It were good therefore to try whether *Glass Re-molten* do lose any *Weight*: for the *Parts* in *Glass* are evenly spread, but they are not so close as in *Gold*; as we see by the easie admission of *Light*, *Heat*, and *Cold*, and by the *Smallness* of the *Weight*. There be other *Bodies Fixed*, which have little or no *Spirit*, so as there is nothing to fly out: as we see in the *Stuff* whereof *Coppels* are made; which they put into *Furnaces*, upon which *Fire* worketh not. So that there are three *Causes of Fixation*; The *Even-spreading* both of the *Spirits* and *Tangible Parts*; the *Closeness* of the *Tangible Parts*; and the *Fejune*ness or extreme *Comminution* of *Spirits*: of which three, the two first may be joyned with a *Nature Liquefiable*, the last not.

Experiment
Solitary touch-
ing Fixation
of Bodies.

799

IT is a profound *Contemplation* in *Nature*, to consider of the *Emptiness* (as we may call it) or *Insatisfaction* of several *Bodies*, and of their *Appetite* to take in others. *Air* taketh in *Lights*, and *Sounds*, and *Smells*, and *Vapours*: And it is most manifest that it doth it with a kind of *Thirst*, as not satisfied with his own former *Consistence*; for else it would never receive them in so suddenly and easily. *Water* and all *Liquors* do hastily receive *Dry* and more *Terrestrial Bodies* proportionable: and *Dry Bodies*, on the other side, drink in *Waters* and *Liquors*; so that (as it was well said by one of the *Ancients*, of *Earthy* and *Watry Substances*) *One is a Glue to another*. *Parchement*, *Skins*, *Cloth*, &c. drink in *Liquors*; though themselves be *Entire Bodies*, and not *Comminuted*, as *Sand* and *Ashes*, nor apparently *Porous*. *Metalls* themselves do receive in readily *Strong-waters*, and *Strong-waters* likewise do readily pierce into *Metalls* and *Stones*: And that *Strong-water* will touch upon *Gold* that will not touch upon *Silver*, and *converso*. And *Gold*, which seemeth by the *Weight* to be the closest and most solid *Body*, doth greedily drink in *Quick-silver*. And it seemeth that this *Reception* of other *Bodies* is not violent; for it is (many times) reciprocal, and as it were with consent. Of the *Cause* of this, and to what *Axiome* it may be referred, consider attentively: for as for the pretty assertion, that *Matter* is like a *Common Strumpet* that desireth all *Forms*, it is but a *Wandering Notion*. Onely *Flame* doth not content it self to take in any other *Body*; but either to overcome and turn another *Body* into it self, as by victory; or it self to die and goe out.

Experiment
Solitary touch-
ing the Rest-
less Nature of
Things in
Themselves, and
their Desire to
change.

800

Gold will not be weighed...
...the more 24 carat gold...
...the more 24 carat gold...

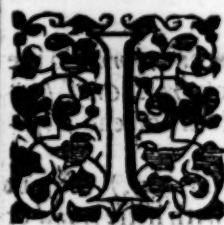
Gold is the only 24 carat gold...
...the more 24 carat gold...
...the more 24 carat gold...

It is a profound statement...
...the more 24 carat gold...
...the more 24 carat gold...



NATURAL HISTORY,

Century IX.



IT is certain that all *Bodies* whatsoever, though they have no *Sense*, yet they have *Perception*: For when one *Body* is applied to another, there is a kind of *Election*, to embrace that which is Agreeable, and to exclude or expel that which is Ingrate: And whether the *Body* be *Alterant* or *Altered*, evermore a *Perception* precedeth *Operation*; for else all *Bodies* would be alike one to another. And sometimes this *Perception* in some kind of *Bodies* is far more subtil then the *Sense*; so that the *Sense* is but a dull thing in comparison of it. We see a *Weather-glass* will find the least difference of the *Weather* in *Heat* or *Cold*, when Men find it not. And this *Perception* also is sometimes at *Distance*, as well as upon the *Touch*; as when the *Load-stone* draweth *Iron*, or *Flame* fireth *Naphtha* of *Babylon* a great distance off. It is therefore a Subject of a very *Noble enquiry*, to enquire of the more subtil *Perceptions*; for it is another key to open *Nature* as well as the *Sense*, and sometimes better. And besides, it is a principal means of *Natural Divination*; for that which in these *Perceptions* appeareth early, in the great effects cometh long after. It is true also, that it serveth to discover that which is hid, as well as to

Experiments
in Consort
touching Per-
ception in Bo-
dies Insensible,
tending to
Natural Divi-
nation, or
Subtil Trials.

308

408

fore-tell that which is to come; as it is in many *Subtil Trials*: As to try whether *Seeds* be old or new, the *Sense* cannot inform; but if you boil them in *Water*, the new seeds will sprout sooner. And so of *Water*, the *Tast* will not discover the best *Water*; but the *speedy consuming* of it, and many other *Means* which we have heretofore let down will discover it. So in all *Physiognomy*, the *Lineaments* of the *Body* will discover those *Natural Inclinations* of the *Minde* which *Disimulation* will conceal, or *Discipline* will suppress. We shall therefore now handle onely those two *Perceptions* which pertain to *Natural Divination* and *Discovery*; leaving the handling of *Perception* in other things to be disposed elsewhere. Now it is true that *Divination* is attained by other *Means*; as if you know the *Causes*, if you know the *Concomitants*, you may judge of the *Effect* to follow: And the like may be said of *Discovery*. But we tie our selves here to that *Divination* and *Discovery* chiefly, which is caused by an early or *subtil Perception*.

The *Aptness* or *Propension* of *Air* or *Water* to corrupt or putrefie, (no doubt) is to be found before it break forth into manifest *Effects* of *Diseases*, *Blasting*, or the like. We will therefore let down some *Prognosticks* of *Pestilential* and *unwholsome Years*.

801 The *Wind* blowing much from the *South* without *Rain*, and *Worms* in the *Oak-apple*, have been spoken of before. Also the *Plenty* of *Frogs*, *Grass-hoppers*, *Flies*, and the like creatures bred of *Putrefaction*, doth portend *Pestilential Years*.

802 Great and *Early Heats* in the *Spring*, (and namely in *May*), without *Winds*, portend the same. And generally so do *Years* with little *Wind* or *Thunder*.

803 Great *Droughts* in *Summer*, lasting till towards the *End* of *August*, and some *gentle Showers* upon them, and then some *Dry Weather* again, do portend a *Pestilent Summer* the *Year* following: for about the *End* of *August* all the *Sweetness* of the *Earth* which goeth into *Plants* or *Trees* is exhaled; (and much more if the *August* be dry,) so that nothing then can breath forth of the *Earth* but a gross *Vapour*, which is apt to corrupt the *Air*: And that *Vapour* by the first *Showers*, if they be *gentle*, is released, and cometh forth abundantly. Therefore they that come abroad soon after those *Showers* are commonly taken with *sickness*. And in *Africk* no body will stirre out of doors after the first *Showers*. But if the first *Showers* come vehemently, then they rather wash and fill the *Earth*, then give it leave to breath forth presently. But if *dry Weather* come again, then it fixeth and continueth the *corruption* of the *Air* upon the first *Showers* begun, and maketh it of ill *Influence* even to the next *Summer*, except a very *Frosty Winter* discharge it, which seldome succeedeth such *Droughts*.

804 The lesser *Infections* of the *Small Pox*, *Purple Feavers*, *Agues* in the *Sum-*
mer

mer Precedent, and hovering all Winter, do portend a great Pestilence in the Summer following: For Putrefaction doth not rise to its height at once.

It were good to lay a piece of Raw Flesh or Fish in the Open Air; and if it putrefie quickly, it is a sign of a Disposition in the Air to Putrefaction. And because you cannot be informed whether the Putrefaction be quick or late, except you compare this Experiment with the like Experiment in another Year; it were not amiss in the same Year, and at the same Time, to lay one piece of Flesh or Fish in the Open Air, and another of the same kind and bigness within Doors: For I judge, that if a general Disposition be in the Air to putrefie, the Flesh or Fish will sooner putrefie abroad, where the Air hath more power, then in the House, where it hath less, being many ways corrected. And this Experiment would be made about the end of March; for that Season is likeliest to discover what the Winter hath done, and what the Summer following will doe upon the Air. And because the Air (no doubt) receiveth great Tincture and Infusion from the Earth, it were good to try that Exposing of Flesh or Fish both upon a Stake of Wood, some height above the Earth, and upon the flat of the Earth.

Take May-Dew, and see whether it putrefie quickly or no; for that likewise may disclose the Quality of the Air, and Vapour of the Earth, more or less Corrupted.

A dry March and a dry May portend a Wholesome Summer, if there be a Showring April between; but otherwise it is a Sign of a Pestilential Year.

As the Discovery of the Disposition of the Air is good for the Prognosticks of Wholesome and Unwholesome Years; so it is of much more use for the Choice of Places to dwell in: at the least for Lodges and Retiring-places for Health, (for Mansion-Houses respect Provisions as well as Health;) wherein the Experiments above-mentioned may serve.

But for the Choice of Places or Seats, it is good to make Trial, not onely of aptness of Air to corrupt, but also of the Moisture and Driness of the Air, and the Temper of it in Heat or Cold; for that may concern Health diversly. We see that there be some Houses wherein Sweet Meats will relect, and Baked Meats will mould, more then in others; and Wainscots will also sweat more, so that they will almost run with Water. All which (no doubt) are caused chiefly by the Moistness of the Air in those Seats. But because it is better to know it before a man buildeth his House, then to find it after, take the Experiments following.

Lay Wooll, or a Sponge, or Bread in the Place you would try, comparing it with some other Places, and see whether it doth not moisten, and make the Wooll or Sponge, &c. more ponderous then the other. And if it do, you may judge of that Place as situate in a Gross and Moist Air.

Because it is certain that in some Places, either by the Nature of the Earth, or by the Situation of Woods and Hills, the Air is more unequal then in others; and Inequality of Air is ever an Enemy to Health; it were good to take two Weather-glasses, matches in all things, and to set them for the same Hours of one day in several places, where no Shade is nor Enclosures; and to mark when you set them how far the Water cometh; and to compare them when you come again, how the Water standeth there. And if you find them Unequal, you may be sure that the Place where the Water is lowest is in the Warmer Air, and the other in the Colder. And the greater the Inequality is of the Ascent or Descent of the Water, the greater is the Inequality of the Temper of the Air.

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The *Predictions* likewise of *Cold* and *Long Winters*, and *Hot* and *Dry Summers*, are good to be known, as well for the *Discovery* of the *Causes*, as for divers *Provisions*. That of *Plenty* of *Haws* and *Heps* and *Briar-Berries*, hath been spoken of before. If *Wainscot* or *Stone* that have used to *Sweat* be more dry in the beginning of *Winter*, or the *Drops* of the *Eaves* of *Houses* come more slowly down then they use, it portendeth a *Hard* and *Frosty Winter*. The *Cause* is, for that it sheweth an *Inclination* of the *Air* to *Dry Weather*, which in *Winter* is ever joyned with *Frost*.

813

Generally a *moist* and a *cool Summer* portendeth a *Hard Winter*. The *Cause* is, for that the *Vapours* of the *Earth* are not dissipated in the *Summer* by the *Sun*; and so they rebound upon the *Winter*.

814

A *Hot* and *Dry Summer* and *Autumn*, and especially if the *Heat* and *Drought* extend far into *September*, portendeth an open beginning of *Winter*; and *Colds* to succeed toward the latter part of the *Winter*, and the beginning of the *Spring*: For till then the former *Heat* and *Drought* bear the sway; and the *Vapours* are not sufficiently multiplied.

815

An *Open* and *Warm Winter* portendeth a *Hot* and *Dry Summer*: For the *Vapours* disperse into the *Winter Showers*; whereas *Cold* and *Frost* keepeth them in, and transporteth them into the late *Spring* and *Summer* following.

816

Birds that use to change *Countries* at certain *Seasons*, if they come earlier, do shew the *Temperature* of *Weather* according to that *Country* whence they came: As the *Winter-Birds*, (namely, *Woodcocks*, *Feldefares*, &c.) if they come earlier, and out of the *Northern Countries*, with us shew *cold Winters*. And if it be in the same *Country*, then they shew a *Temperature* of *Season*, like unto that *Season* in which they come: As *Swallows*, *Bats*, *Cuckoos*, &c. that come towards *Summer*, if they come early, shew a *hot Summer* to follow.

817

The *Prognosticks* more immediate of *Weather* to follow soon after are more certain then those of *Seasons*. The *Resounding* of the *Sea* upon the *Shore*, and the *Murmur* of *Winds* in the *Woods*, without apparent *Wind*, shew *Wind* to follow: For such *Winds*, breathing chiefly out of the *Earth*, are not at the first perceived, except they be pent by *Water* or *Wood*. And therefore a *Murmur* out of *Caves* likewise portendeth as much.

818

The *Upper Regions* of the *Air* perceive the *Collection* of the *Matter* of *Tempest* and *Winds* before the *Air* here below: And therefore the *Observing* of the *smaller Stars* is a *Sign* of *Tempests* following. And of this kind you shall find a number of *Instances* in our *Inquisition de Ventis*.

819

Great Mountains have a *Perception* of the *Disposition* of the *Air* to *Tempests* sooner then the *Valleys* or *Plains* below: And therefore they say in *Wales*, when certain *Hills* have their *Night-Caps* on, they mean *Mischief*. The *Cause* is, for that *Tempests*, which are for the most part bred above in the *Middle Region*, (as they call it) are soonest perceived to collect in the *Places* next it.

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The *Air* and *Fire* have *subtil Perceptions* of *Wind Rising* before Men find it. We see the *Trembling* of a *Candle* will discover a *Wind*, that otherwise we do not feel; and the *Fluttering* burning of *Flames* doth shew the *Air* beginneth to be unquiet; and so doe *Coals* of *Fire* by casting off the *Ashes* more then they use. The *Cause* is, for that no *Wind* at the first, till it hath struck and driven the *Air*, is apparent to the *Sense*. But *Flame* is easier to move then *Air*. And for the *Ashes*, it is no marvel though *Wind* unperceived shake them off; for we usually try which way the *Wind* bloweth.

bloweth, by casting up *Grass* or *Chaff*, or such light things, into the *Air*.

When *Wind* expieth from under the *Sea*, as it causeth some *Resoundings* of the *Water*, (whereof we spake before) so it causeth some *Light Motions* of *Bubbles* and *white Circles of Froth*. The *Cause* is, for that the *Wind* cannot be perceived by the *Sense*, until there be an *Eruption* of a great *Quantity* from under the *Water*, and so it getteth into a *Body*, whereas in the first *Putting up* it cometh in little portions.

We spake of the *Ashes* that *Coals* cast off; and of *Grass* and *Chaff* carried by the *Wind*: so any *light Thing* that moveth when we find no *Wind*, sheweth a *Wind* at hand: As when *Feathers* or *Down* of *Thistles* fly to and fro in the *Air*.

For *Prognosticks* of *Weather* from *Living Creatures*, it is to be noted, That *Creatures* that live in the *Open Air*, (*sub Dio*) must needs have a quicker *Impression* from the *Air* then *Men* that live most within *Doors*; and especially *Birds* who live in the *Air*, freest and clearest, and are aptest by their *Voice* to tell *Tales* what they finde, and likewise by the *Motion* of their *Flight* to expresse the same.

Water-Fowls, (as *Sea-Gulls*, *Moor-Hens*, &c.) when they flock and fly together from the *Sea* towards the *Shores*; and contrariwise *Land-Birds*, (as *Crows*, *Swallows*, &c.) when they fly from the *Land* to the *Waters*, and beat the *Waters* with their *Wings*, do fore-shew *Rain* and *Wind*. The *Cause* is, *Pleasure* that both kinds take in the *Moistness* and *Density* of the *Air*, and so desire to be in *Motion*, and upon the *Wing*, whithersoever they would otherwise goe: For it is no marvel that *Water-Fowl* do joy most in that *Air* which is likest *Water*: And *Land-Birds* also, (many of them) delight in *Bathing* and *Moist Air*. For the same reason also many *Birds* do prune their *Feathers*, and *Geese* do gaggle, and *Crows* seem to call upon *Rain*; all which is but the comfort they seem to receive in the *Relenting* of the *Air*.

The *Heron* when she soareth high, (so as sometimes she is seen to pass over a *Cloud*) sheweth *Winds*: But *Kites* flying aloft shew *Fair* and *Dry weather*. The *Cause* may be, for that they both mount most into the *Air* of that temper wherein they delight: And the *Heron*, being a *Water-Fowl*, taketh pleasure in the *Air* that is condensed; and besides, being but heavy of *Wing*, needeth the help of the *Grosser Air*. But the *Kite* affecteth not so much the *Grossness* of the *Air*, as the *Cold* and *Freshness* thereof; for being a *Bird of Prey*, and therefore *hot*, she delighteth in the *Fresh Air*, and (many times) flieth against the *Wind*; as *Trouts* and *Salmons* swim against the *Stream*. And yet it is true also, that all *Birds* find an ease in the depth of the *Air*, as *Swimmers* do in a deep *Water*. And therefore when they are aloft, they can uphold themselves with their *Wings spread*, scarce moving them.

Fishes when they play towards the *Top* of the *Water* do commonly foretell *Rain*. The *Cause* is, for that a *Fish* hating the *Dry*, will not approach the *Air* till it groweth *Moist*; and when it is *Dry* will lie it, and swim lower.

Beasts do take comfort (generally) in a *Moist Air*; and it maketh them eat their *Meat* better: And therefore *Sheep* will get up betimes in the

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the Morning to feed against *Rain*; and *Cattel*, and *Deer*, and *Conies* will feed hard before *Rain*; and a *Heifer* will put up his *Nose*, and snuff in the *Air* against *Rain*.

827 The *Trifoil* against *Rain* swelleth in the *Stalk*, and so standeth more upright; for by *Wet*, *Stalks* do erect, and *Leaves* bow down. There is a small *Red Flower* in the *Stubble-fields*, which *Countrey-people* call the *Wincopipe*; which if it open in the *Morning*, you may be sure of a fair *Day* to follow.

828 Even in *Men*, *Aches* and *Hurts* and *Corns* do engrieve either towards *Rain*, or towards *Frost*: For the one maketh the *Humours* more to abound, and the other maketh them sharper. So we see both *Extremes* bring the *Gout*.

829 *Worms*, *Vermine*, &c. do fore-shew (likewise) *Rain*: For *Earth-worms* will come forth, and *Moles* will cast up more, and *Fleas* bite more against *Rain*.

830 *Solid Bodies* likewise fore-shew *Rain*: As *Stones* and *Wainscot* when they sweat, and *Boxes* and *Peggs* of *Wood* when they *Draw* and *Wind* hard: though the former be but from an *outward Cause*, for that the *Stone* or *Wainscot* turneth and beateth back the *Air* against it self; but the latter is an *Inward* swelling of the *Body* of the *Wood* it self.

Experiment
Solitary touching the
Nature of Appetite in the
Stomack.

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Appetite is moved chiefly by things that are *Cold* and *Dry*. The *Cause* is, for that *Cold* is a kind of *Indigence* of *Nature*, and calleth upon *Supply*; and so is *Driness*: And therefore all *Sour things* (as *Vinegar*, *Juice* of *Lemons*, *Oil* of *Vitriol*, &c.) provoke *Appetite*. And the *Disease* which they call *Appetitus Caninus* consisteth in the *Matter* of an *Acide* and *Glossy Phlegm* in the *Mouth* of the *Stomack*. *Appetite* is also moved by *Sour things*; for that *Sour things* induce a *Contraction* in the *Nerves*, placed in the *Mouth* of the *Stomack*, which is a great *Cause* of *Appetite*. As for the *Cause* why *Onions*, and *Sals*, and *Pepper* in *Baked Meats* move *Appetite*, it is by *Vellication* of those *Nerves*; for *Motion* whetteth. As for *Worm-wood*, *Olives*, *Capers*, and others of that kind, which participate of *Bitterness*, they move *Appetite* by *Absterfion*. So as there be four principal *Causes* of *Appetite*: The *Refrigeration* of the *Stomack* joyned with some *Driness*, *Contraction*, *Vellication*, and *Absterfion*; besides *Hunger*, which is an *Emptiness*. And yet *Over-fasting* doth (many times) cause the *Appetite* to cease; for that want of *Meat* maketh the *Stomack* draw *Humours*, and such *Humours* as are light and *Cholerick*, which quench *Appetite* most.

Experiment
Solitary touching Sweetness of Odour from the
Rain-Bow.

832

IT hath been observed by the *Ancients*, that where a *Rain-bow* seemeth to hang over, or to touch, there breatheth forth a *sweet Smell*. The *Cause* is, for that this happeneth but in certain matters which have in themselves some *Sweetness*, which the *gentle Dew* of the *Rain-Bow* doth draw forth; and the like do *soft Showers*, for they also make the *Ground* sweet: But none are so delicate as the *Dew* of the *Rain-Bow* where it falleth. It may be also that the *Water* it self hath some *Sweetness*; for the *Rain-Bow* consisteth of a *Glomeration* of *small Drops*, which cannot possibly fall but from the *Air* that is very *low*, and therefore may hold the very *Sweetness* of the *Herbs* and *Flowers* as a *Distilled water*: For *Rain* and other *Dew* that fall from high cannot preserve the smell, being dissipated in the drawing up: neither do we know whether some *Water* it self may not have some degree of *Sweetness*. It is true, that we find it sensibly in no *Pool*, *River*,

nor

nor *Fountain*; but good *Earth* newly turned up hath a *freshness* and good *scent*; which *Water*, if it be not too equal, (for equal *objects* never move the *Sense*) may also have. Certain it is, that *Bay-salt*, which is but a kind of *Water* congealed, will sometimes smell like *Violets*.

TO Sweet smells *Heat* is requisite to concoct the *Matter*, and some *Moisture* to spread the *Breath* of them. For *Heat*, we see that *Woods* and *Spices* are more *Odorate* in the *hot Countries* then in the *cold*: for *Moisture*, we see that things too much dried lose their *Sweetness*; and *Flowers* growing smell better in a *Morning* or *Evening* then at *Noon*. Some *Sweet smells* are destroyed by approach to the *Fire*; as *Violets*, *Wall-flowers*, *Gilli-flowers*, *Pinks*, and generally all *Flowers* that have *cool* and *delicate Spirits*. Some continue both on the *fire* and from the *fire*; as *Rose-water*, &c. Some do scarce come forth, or at least not so pleasantly, as by means of the *fire*; as *Juniper*, *Sweet-Gums*, &c. and all *Smells* that are enclosed in a *Fast Body*: but (generally) those *Smells* are the most grateful where the *Degree* of *heat* is small, or where the strength of the *Smell* is allayed; for these things do rather wooe the *Sense* then satiate it. And therefore the smell of *Violets* and *Roses* exceedeth in *sweetness* that of *Spices*; and *Gums* and the strongest sort of *smells* are best in a *weft* afar off.

IT is certain that no *smell* issueth but with *Emission* of some *Corporeal Substance*; nor as it is in *Light*, and *Colours*, and *Sounds*; for we see plainly that *Smell* doth spread nothing that distance that the other doe. It is true, that some *Woods* of *Orenges* and *Heaths* of *Rose-mary* will smell a great way into the *Sea*, perhaps twenty Miles; but what is that, since a peal of *Ordinance* will doe as much, which moveth in a small compass, whereas those *Woods* and *Heaths* are of vast spaces: Besides, we see that *Smells* do adhere to *hard Bodies*; as in perfuming of *Gloves*, &c. which sheweth them *Corporeal*: and do last a great while, which *Sounds* and *Light* do not.

THE *Excrements* of most *Creatures* smell ill, chiefly to the same *Creature* that voideth them: For we see, besides that of *Man*, that *Pigeons* and *Horses* thrive best, if their *Houses* and *Stables* be kept sweet; and so of *Cage-Birds*: and the *Cat* burieth that which she voideth. And it holdeth chiefly in those *Beasts*, which feed upon *Flesh*. *Dogs* (almost) onely of *Beasts* delight in *Fetide Odours*; which sheweth there is somewhat in their *Sense* of *Smell*, differing from the smells of other *Beasts*. But the *Cause* why *Excrements* smell ill is manifest; for that the *Body* it self rejecteth them; much more the *Spirits*. And we see that those *Excrements* that are of the *First Digestion* smell the worst, as the *Excrements* from the *Belly*; those that are from the *Second Digestion*, less ill, as *Urine*; and those that are from the *Third*, yet less, for *Sweat* is not so bad as the other two, especially of some *Persons* that are full of *Heat*. Likewise most *Purefactions* are of an *Odious* smell, for they smell either *Fetile* or *Mouldy*. The *Cause* may be, for that *Purefaction* doth bring forth such a *Consistence* as is most contrary to the consistence of the *Body* whilest it is sound; for it is a mere dissolution of that *Form*. Besides, there is another reason, which is profound; and it is, That the *objects* that please any of the *senses*, have (all) some *Equation*, and (as it were) *Order* in their *Composition*; but where those are wanting the object is ever ingrate. So *Mixture* of many *Disagreeing colours* in

Experiment
Solitary touch-
ing Sweet
Smells.

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Experiment
Solitary touch-
ing the
Corporeal Sub-
stance of Smells.

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Experiment
Solitary touch-
ing Fetide
and Fragrant
Odours.

835

is never unpleasant to the *Eie*: Mixture of *Discordant Sounds* is unpleasant to the *Ear*; Mixture or *hotch-potch* of many *Tasts* is unpleasant to the *Tast*; Harshness and ruggedness of Bodies is unpleasant to the *Touch*. Now it is certain that all *Putrefaction*, being a *Dissolution* of the first *Form*, is a mere *Confusion*, and *unformed* mixture of the Part. Nevertheless, it is strange, and seemeth to cross the former Observation, that some *Putrefactions* and *Excrements* do yield excellent *Odours*; as *Civet* and *Musk*, and, as some think, *Amber-greece*, for divers take it (though unprobably) to come from the *Sperm* of *Fish*: and the *Moss* we spake of from *Apple-trees* is little better than an *Excretion*. The reason may be, for that there passeth in the *Excrements*, and remaineth in the *Putrefactions*, some good spirits; especially where they proceed from *Creatures* that are very *Hot*. But it may be also joyned with a further cause, which is more subtil; and it is, that the *Senses* love not to be over-pleased, but to have a commixture of somewhat that is in it self ingrate. Certainly, we see how *Discords* in *Musick*, falling upon *Concords*, make the *Sweetest Strains*: And we see again what strange *tasts* delight the *Tast*; as *Red-herrings*, *Caviare*, *Parmesan*, &c. And it may be the same holdeth in *Smells*. For those kind of *Smells* that we have mentioned are all strong, and do pull and vellicate the *Sense*. And we find also, that places where men *Urine* commonly have some smell of *Violets*. And *Urine*, if one hath eaten *Nutmeg*, hath so too.

The Slothful, General, and Indefinite *Contemplations* and *Notions* of the *Elements* and their *Conjugations*, of the *Influences* of *Heaven*, of *Hot*, *Cold*, *Moisture*, *Drought*, *Qualities Active*, *Passive*, and the like, have swallowed up the true *Passages*, and *Processes*, and *Affects*, and *Consistencies* of *Matter* and *Natural Bodies*. Therefore they are to be set aside, being but *Notional*, and ill *Limited*; and *Definite Axiomes* are to be drawn out of measured *Instances*: and so assent to be made to the more *General Axiomes* by *Scale*. And of these kinds of *Processes* of *Nature*, and *Characters* of *Matter*, we will now set down some *Instances*.

Experiment
Solitary touch-
ing the Causes
of Putre-
faction.

836

AL L *Putrefactions* come chiefly from the inward spirits of the *Body*, and partly also from the *Ambient Body*, be it *Air*, *Liquor*, or whatsoever else. And this last, by two *Means*: either by *Ingress* of the *Substance* of the *Ambient Body* into the *Body Putrescied*; or by *Excitation* and *Solicitation* of the *Body Putrescied*, and the *Parts* thereof, by the *Body Ambient*. As for the received Opinion, that *Putrefaction* is caused either by *Cold*, or *Peregrine* and *Preternatural Heat*, it is but *Nugation*: For *Cold* in things *Inanimate* is the greatest enemy that is to *Putrefaction*; though it extinguisheth *Vivification*, which ever consisteth in spirits *Attenuate*; which the *Cold* doth congeal and coagulate. And as for the *Peregrine heat*, it is thus farre true: That if the proportion of the *Adventive heat* be greatly predominant to the *Natural heat* and spirits of the *Body*, it tendeth to *dissolution*, or notable *alteration*. But this is wrought by *Emission*, or *Suppression*, or *Suffocation* of the native *Spirits*, and also by the *Disordination* and *Discomposure* of the *Tangible Parts*, and other *Passages* of *Nature*; and not by a *Consist* of *Heats*.

IN *Versions* or *main Alterations* of *Bodies*, there is a *Medium* between the *Body* as it is at first, and the *Body* resulting; which *Medium* is *Corpus imperfecte Mistum*, and is transitory, and not durable; as *Mists*, *Smokes*, *Vapours*, *Chylus* in the *Stomack*, *Living Creatures* in the first *Vivification*: And the *Middle Action* which produceth such *Imperfect Bodies* is fitly called (by some of the *Ancients*) *Inquination*, or *Inconcoction*, which is a kind of *Putrefaction*; for the *Parts* are in *Confusion* till they settle one way or other.

Experiment
Solitary touching
Bodies
Imperfectly
Mixed.

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THE word *Concoction*, or *Digestion*, is chiefly taken into use from *Living Creatures* and their *Organs*, and from thence extended to *Liquors* and *Fruits*, &c. Therefore they speak of *Meat Concocted*, *Urine* and *Excrements Concocted*; and the *Four Digestions*, (in the *Stomack*, in the *Liver*, in the *Arteries* and *Nerves*, and in the *several Parts* of the *Body*) are likewise called *Concoctions*; and they are all made to be the works of *Heat*. All which *Notions* are but ignorant catches of a few things, which are most obvious to *Mens observations*. The constantest *Notion* of *Concoction* is, that it should signify the *Degrees* of *Alteration* of one *Body* into another, from *Crudity* to *Perfect Concoction*, which is the *Ultimity* of that *Action* or *Process*. And while the *Body* to be *Converted* and *Altered* is too strong for the *Efficient* that should *Convert* or *Alter* it, (whereby it resisteth, and holdeth fast in some degree the first *Form* or *Consistence*) it is (all that while) *Crude* and *Inconcoct*, and the *Process* is to be called *Crudity* and *Inconcoction*. It is true, that *Concoction* is in great part the *Work* of *Heat*; but not the *Work* of *Heat* alone: for all things that further the *Conversion* or *Alteration* (as *Rest*, *Mixture* of a *Body* already *Concocted*, &c.) are also *Means* to *Concoction*. And there are of *Concoction* two *Periods*; the one *Assimilation*, or *Absolute Conversion* and *Substition*; the other *Maturation*: whereof the former is most conspicuous in the *Bodies* of *Living Creatures*, in which there is an *Absolute Conversion* and *Assimilation* of the *Nourishment* into the *Body*, and likewise in the *Bodies* of *Plants*; and again in *Metalls*, where there is a full *Transmutation*. The other (which is *Maturation*) is seen in *Liquors* and *Fruits*; wherein there is not desired, nor pretended, an utter *Conversion*, but onely an *Alteration* to that *Form* which is most sought for *Mans* use; as in *Clarifying* of *Drinks*, *Ripening* of *Fruits*, &c. But note that there be two kinds of *Absolute Conversions*. The one is, when a *Body* is converted into another *Body* which was before; as when *Nourishment* is turned in *Flesh*: That is it which we call *Assimilation*. The other is, when the *Conversion* is into a *Body* merely new, and which was not before; as if *Silver* should be turned to *Gold*, or *Iron* to *Copper*: And this *Conversion* is better called, for distinction sake, *Transmutation*.

Experiment
Solitary touching
Concoction and
Crudity.

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THERE are also divers other *Great Alterations* of *Matter* and *Bodies* besides those that tend to *Concoction* and *Maturation*; for whatsoever doth so alter a *Body* as it returneth not again to that it was, may be called *Alteratio Major*: as when *Meat* is *Boiled*, or *Roasted*, or *Fried*, &c. or when *Bread* and *Meat* are *Baked*; or when *Cheese* is made of *Curds*, or *Butter* of *Cream*, or *Coals* of *Wood*, or *Bricks* of *Earth*; and a number of others. But to apply *Notions Philosophical* to *Plebeian Terms*; or to say, where the *Notions* cannot fitly be reconciled, that there wanteth a *Term* or *Nomenclature* for it, (as the *Ancients* used;) they be but shifts of *Ignorance*: For

Experiment
Solitary touching
Alterations which
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Knowledge

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Experiment
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Concoction and *Crudity*.

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THERE are also divers other *Great Alterations* of *Matter* and *Bodies* besides those that tend to *Concoction* and *Maturation*; for whatsoever doth so alter a *Body* as it returneth not again to that it was, may be called *Alteratio Major*: as when *Meat* is *Boiled*, or *Roasted*, or *Fried*, &c. or when *Bread* and *Meat* are *Baked*; or when *Cheese* is made of *Curds*, or *Butter* of *Cream*, or *Coals* of *Wood*, or *Bricks* of *Earth*; and a number of others. But to apply *Notions Philosophical* to *Plebeian Terms*; or to say, where the *Notions* cannot fitly be reconciled, that there wanteth a *Term* or *Nomenclature* for it, (as the *Ancients* used;) they be but shifts of *Ignorance*: For

Experiment
Solitary touching
Alterations which
may be called
Majors.

839

Knowledge

Knowledge will be ever a *Wandering and Indigested Thing*, if it be but a *Commixture* of a few *Notions* that are at hand, and occurre, and not excited from sufficient number of instances, and those well collated.

The *Consistencies of Bodies* are very divers; *Dense, Rare; Tangible, Pneumatical; Volatile, Fixed; Determinate, not Determinate; Hard, Soft; Cleaving, not Cleaving; Congelable, not Congelable; Liquefiable, not Liquefiable; Fragile, Tough; Flexible, Inflexible; Traetile*, or to be drawn forth in length, *Intraetile; Porous, Solide; Equal and Smooth, Unequal; Venous and Fibrous*, and with *Grains, Entire*, and divers others: all which to referre to *Heat and Cold, and Moisture and Drought*, is a *Compendious and Inutile Speculation*. But of these see principally our *Abecedarium Naturæ*, and otherwise *sparsum* in this our *Sylva Sylvarum*: Nevertheless, in some good part, we shall handle divers of them now presently.

Experiment
Solitary touch-
ing Bodies
Liquefiable
and not Lique-
fiable.

840

Liquefiable and not Liquefiable proceed from these Causes: *Liquefaction* is ever caused by the *Detention* of the *Spirits*, which play within the *Body*, and open it. Therefore such *Bodies* as are more *Turgid of Spirit*, or that have their *Spirits* more *streightly imprisoned*, or again that hold them *better pleased and content*, are *Liquefiable*: for these three *Dispositions of Bodies* do arrest the *Emission* of the *Spirits*. An Example of the first two *Properties* is in *Metalls*; and of the last in *Grease, Pitch, Sulphur, Butter, Wax, &c.* The *Disposition* not to *Liquefie* proceedeth from the *ease Emission* of the *Spirits*, whereby the *Grosser Parts* contract: and therefore *Bodies* *jeune* of *Spirits*, or which part with their *Spirits* more *willingly*, are not *Liquefiable*; as *Wood, Clay, Free-stone, &c.* But yet even many of those *Bodies* that will not *Melt*, or will hardly *Melt*, will notwithstanding *Soften*; as *Iron* in the *Forge*, and a *Stick* bathed in hot *Ashes*, which thereby becometh more *Flexible*. Moreover, there are some *Bodies* which do *Liquefie* or dissolve by *Fire*; as *Metalls, Wax, &c.* and other *Bodies* which dissolve in *Water*; as *Salt, Sugar, &c.* The Cause of the former proceedeth from the *Dilatation* of the *Spirits* by *Heat*: The Cause of the latter proceedeth from the *Opening* of the *Tangible Parts*, which desire to receive the *Liquor*. Again, there are some *Bodies* that dissolve with both; as *Gumme, &c.* And those be such *Bodies* as on the one side have good store of *Spirit*, and on the other side have the *Tangible Parts* *indigent* of *Moisture*: for the former helpeth to the *Dilating* of the *Spirits* by the *Fire*; and the latter stimulateth the *Parts* to receive the *Liquor*.

Experiment
Solitary touch-
ing Bodies
Fragile and
Tough.

841

OF *Bodies* some are *Fragile*, and some are *Tough* and not *Fragile*; and in the *Breaking*, some *Fragile Bodies* break but where the force is, some shatter and flie in many pieces. Of *Fragility* the Cause is an *Impotency* to be *Extended*: And therefore *Stone* is more *Fragile* then *Metall*; and so *Fittile Earth* is more *Fragile* then *Crude Earth*, and *Dry Wood* then *Green*. And the Cause of this *unaptness* to *Extension* is the *small quantity* of *Spirits*, (for it is the *Spirit* that furthereth the *Extension* or *Dilatation* of *Bodies*;) and it is ever concomitant with *Porosity*, and with *Driness* in the *Tangible Parts*.

Contra

Contrariwise, *Tough Bodies* have more *Spirits*, and fewer *Pores*, and *Moister Tangible Parts*: Therefore we see that *Parchment* or *Leather* will stretch, *Paper* will not; *Wollen Cloth* will renter, *Linnen* scarcely.

ALL *Solid Bodies* consist of *Parts* of two several *Natures*; *Pneumatical*, and *Tangible*; And it is well to be noted, that the *Pneumatical Substance* is in some *Bodies*, the *Native Spirit* of the *Body*; And in some other, plain *Air* that is gotten in; As in *Bodies desiccate*, by *Heat*, or *Age*: For in them, when the *Native Spirit* goeth forth, and the *Moisture* with it, the *Air* with time getteth into the *Pores*. And those *Bodies* are ever the more *Fragile*; For the *Native Spirit* is more *Yielding* and *Extensive*, (especially to follow the *Parts*,) than *Air*. The *Native Spirits* also admit great *Diversity*; As *Hot*, *Cold*, *Abrive*, *Dull*, &c. Whence proceed most of the *Vertues*, and *Qualities* (as we call them) of *Bodies*: But the *Air Intermixt*, is without *Vertues*, and maketh Things *Inspid*, and without any *Exstimulation*.

Experiment
Solitary, touch-
ing the
Two Kinds of
Pneumatics
in Bodies.

842

THE *Concretion* of *Bodies* is (commonly) solved by the *contrary*; As *Ice*, which is congealed by *Cold*, is dissolved by *Heat*; *Salt* and *Sugar*, which are Excocted by *Heat*, are dissolved by *Cold*, and *Moisture*. The *Cause* is, for that these *Operations* are rather *Returns* to their former *Nature*, than *Alterations*: So that the *contrary* cureth. As for *Oyl*, it doth neither easily congeal with *Cold*, nor thicken with *Heat*. The *Cause* of both *Effects*, though they be produced by *Contrary Efficients*, seemeth to be the Same; And that is, because the *Spirit* of the *Oyl*, by either means, exaleth little; For the *Cold* keepeth it in; and the *Heat*, (except it be *Vehement*,) doth not call it forth. As for *Cold*, though it take hold of the *Tangible Parts*, yet as to the *Spirits*, it doth rather make them *Swell*, than *Congea*l them: As when *Ice* is congealed in a *Cup*, the *Ice* will *Swell* in stead of *Contracting*; And sometimes *Rift*.

Experiment
Solitary, touch-
ing Concre-
tion and Disso-
lution of Bo-
dies.

843

OF *Bodies*, some (we see) are *Hard*, and some *Soft*: The *Hardness* is caused (chiefly) by the *Jejuneness* of the *Spirits*; And their *Imparity* with the *Tangible Parts*: Both which if they be in a greater degree, maketh them not onely *Hard*, but *Fragile*, and less *Enduring* of *Pressure*; As *Steel*, *Stone*, *Glass*, *Dry Wood*, &c. *Softness* commeth (contrariwise) by the Greater *Quantitie* of *Spirits*; (which ever helpeth to Induce *Yielding* and *Cession*;) And by the more *Equal Spreading* of the *Tangible Parts*, which thereby are more *Sliding*, and *Following*; As in *Gold*, *Lead*, *Wax*, &c. But note, that *Soft Bodies*, (as we use the word) are of two *Kinds*; The one, that easily giveth place to another *Body*, but altereth not *Bulk*, by *Rising* in other *Places*: And therefore we see that *Wax*, if you put any thing into it, doth not rise in *Bulk*, but onely giveth *Place*: For you may not think, that in *Printing* of *Wax*, the *Wax* riseth up at all; But onely the *depressed Part* giveth place, and the other remaineth as it was. The other that altereth *Bulk* in the *Cession*, as *Water*, or other *Liquors*, if you put a *Stone*, or any Thing into them, they give place (indeed) easily, but then they rise all over: Which is a *False Cession*; For it is in *Place*, and not in *Body*.

Experiment
Solitary, touch-
ing Hard
and Soft
Bodies.

844

ALL *Bodies Ductile*, and *Tensile*, (as *Metals*) that will be drawn into *Wires*; *Wood*, and *Tow* that will be drawn into *Tarn*, or *Thred*, have in them the *Appetite* of *Not Discontinuing*, Strong; Which maketh them follow the *Force*, that pulleth them out; And yet so, as not *Discontinue* or

Experiment
Solitary, touch-
ing Bodies
Ductile and
Tensile.

845

R

for sake

forfake their own *Body*. *Viscous Bodies*, (likewise,) as *Pitch*, *Wax*, *Bird-Lime*, *Cheese* *roasted*, will draw forth, and roap. But the difference between *Bodies Fibrous*, and *Bodies Viscous*, is Plain; For all *wooll*, and *Tow*, and *Cotton*, and *Silk* (especially *raw Silk*) have, besides their desire of *Continuance*, in regard of the *Tenuity* of their *Thred*, a *Greediness* of *Moisture*; And by *Moisture* to joyn and incorporate with other *Thred*; Especially, if there be a little *weatting*; As appeareth by the *Twisting* of *Thred*; And the Practice of *Twirling* about of *Spindles*. And we see also that *Gold* and *Silver Thred* cannot be made without *Twisting*.

THE Differences of *Impressible*, and *Not Impressible*; *Figurable*, and *Not Figurable*; *Mouldable*, and *Not Mouldable*; *Scissible*, and *Not Scissible*; and many other *Passions* of *Matter*, are *Plebeian Notions*, applied unto the *Instruments* and *Uses* which Men ordinarily practise; But they are all but the *Effects* of some of these *Causes* following; Which we will enumerate without Applying them, because that would be too long. The first is the *Cession*, or *Not Cession* of *Bodies*, into a *Smaller Space*, or *Room*, keeping the *Outward Bulk*, and not flying up. The Second is the *Stronger* or *Weaker Appetite*, in *Bodies*, to *Continuance*, and to fly *Discontinuities*. The third is the *Disposition* of *Bodies*, to *Contract*, or *Not Contract*; And again, to *Extend*, or *Not Extend*. The Fourth is the *Small Quantity*, or *Great Quantity* of the *Pneumatical* in *Bodies*. The Fifth is the *Nature* of the *Pneumatical*, whether it be *Native Spirit* of the *Body*, or *Common Air*. The Sixth is, the *Nature* of the *Native Spirits* in the *Body*, whether they be *Active*, and *Eager*, or *Dull*, and *Gentle*. The Seventh is the *Emission* or *Detention* of the *Spirits* in *Bodies*. The Eighth is the *Dilatation*, or *Contraction* of the *Spirits* in *Bodies*, while they are detained. The Ninth is the *Collocation* of the *Spirits* in *Bodies*; whether the *Collocation* be *Equal*, or *Unequal*: And again, whether the *Spirits* be *Coacervate*, or *Diffused*. The Tenth is the *Densitie* or *Raritie* of the *Tangible Parts*. The Eleventh is the *Equality*, or *Inequality* of the *Tangible Parts*. The Twelfth is the *Disgestion*, or *Crudity* of the *Tangible Parts*. The Thirteenth is the *Nature* of the *Matter*, whether *Sulphureous*, or *Mercurial*, or *Watry*, or *Oily*, *Dry*, and *Terrestrial*, or *Moist*, and *Liquid*; which *Natures* of *Sulphureous* and *Mercurial*, seem to be *Natures Radical*, and *Principal*. The Fourteenth is the *Placing* of the *Tangible Parts*, in *Length*, or *Transverse*; (As it is in the *Warp*, and the *woof* of *Textiles*;) *More Inward*, or *More Outward*, &c. The Fifteenth is the *Porosity*, or *Imporosity* betwixt the *Tangible Parts*; And the *Greatness*, or *Smallness* of the *Pores*. The Sixteenth is the *Collocation* and *Posture* of the *Pores*. There may be more *Causes*; But these doe occur for the Present.

TAKE *Lead*, and melt it, and in the Middest of it, when it beginneth to Congeal, make a little Dint, or Hole, and put *Quick-Silver* wrapped in a Peece of *Linmen* into that Hole, and the *Quick-Silver* will fix, and run no more, and endure the Hammer. This is a Noble Instance of *Induration*, by *Consent* of one *Body* with another, and *Motion* of *Excitation* to *Imitate*; For to ascribe it onely to the *Vapour* of *Lead*, is less Probable. *Quere* whether the *Fixing* may be in such a degree, as it will be *Figured* like other *Metals*. For if so, you may make *Works* of it for some purposes, so they come not near the *Fire*.

Sugar

Experiment
Solitary, touch-
ing other
Passions of
Matter, and
Characters of
Bodies.

846

Experiment
Solitary, touch-
ing Indura-
tion by Sympa-
thy.

847

Sugar hath put down the use of *Honey*; Infomuch as we have lost those *Observations*, and *Preparations* of *Honey*, which the *Antients* had, when it was more in Price. First, it seemeth, that there was, in old time, *Tree-Honey*, as well as *Bee-Honey*; Which was the *Tear* or *Bloud* issuing from the *Tree*: Infomuch, as one of the *Antients* relateth, that in *Tribesond*, there was *Honey* issuing from the *Box-Trees*, which made *Men* Mad. Again, in *Antient* time, there was a kind of *Honey*, which either of the own Nature, or by Art, would grow as Hard as *Sugar*; And was not so *Lushion* as Ours. They had also a *wine* of *Honey*, which they made thus. They crushed the *Honey* into a great *Quantity* of *Water*, and then strained the *Liquor*; After they boyled it in a *Copper* to the half; Then they powred it into *Earthen Vessels* for a small time; And after turned it into *Vessels* of *Wood*, and kept it for many years. They have also, at this day, in *Russia*, and those *Northern Countries*, *Mead Simple*, which (well made, and seasoned) is a good wholesome *Drink*, and very Clear. They use also in *Wales*, a Compound *Drink* of *Mead*, with *Herbs*, and *Spices*. But mean-while it were good, in recompence of that we have lost in *Honey*, there were brought in use a *Sugar-Mead*, (for so we may call it,) though without any mixture at all of *Honey*; And to brew it, and keep it stale, as they use *Mead*; For certainly, though it would not be so *Abstersive*, and *Opening*, and *Solutive* a *Drink* as *Mead*; yet it will be more gratefull to the *Stomach*, and more *Lenitive*, and fit to be used in *Sharp Diseases*: For we see, that the use of *Sugar* in *Beer*, and *Ale*, hath good *Effects* in such Cases.

Experiment
Solitary, touch-
ing *Honey*
and *Sugar*.
848

IT is reported by the *Antients*, that there is a Kind of *Steel*, in some places, which would polish almost as white and bright as *Silver*. And that there was in *India* a kind of *Brass*, which (being polished) could scarce be discerned from *Gold*. This was in the *Natural Vre*; but I am doubtfull, whether *Men* have sufficiently refined *Metals*, which we count *Base*; As whether *Iron*, *Brass*, and *Tin*, be refined to the Height? But when they come to such a Fineness, as serveth the ordinary use, they trie no further.

Experiment
Solitary, touch-
ing the
Finer Sort of
Base Metals.
849

THere have been found certain *Cements* under *Earth*, that are very Soft; And yet taken forth into the *Sun*, harden as Hard as *Marble*: There are also ordinary *Quarries* in *Summerset-shire*, which in the *Quarry* cut soft to any bigness, and in the *Building* prove firm, and hard.

Experiment
Solitary, touch-
ing *Cements*
and *Quarries*.
850

Living *Creatures* (generally) doe change their *Hair* with *Age*, turning to be *Gray*, and *White*: As is seen in *Men*, though some Earlier, some Later; In *Horses*, that are *Dappled*, and turn *White*; in *Old Squirrels*, that turn *Gray*; And many Others. So doe some *Birds*; As *Ygnets*, from *Gray* turn *White*; *Hawks* from *Brown* turn more *White*; And some *Birds* there be, that upon their *Moulting*, doe turn Colour; As *Robin-Red-Breasts*, after their *Moulting* grow to be *Red* again by degrees; So doe *Gold-Finches* upon the *Head*. The Cause is, for that *Moisture* doth (chiefly) colour *Hair*, and *Feathers*; And *Dryness* turneth them *Gray* and *White*; Now *Hair* in *Age* waxeth *Dryer*: So doe *Feathers*. As for *Feathers*, after *Moulting*, they are *Young Feathers*, and so all one as the *Feathers* of *Young Birds*. So the *Beard* is younger than the *Hair* of the *Head*, and doth (for the most part) wax *Hoarie* later. Out of this Ground, a *Man* may devise the *Means* of *Altering* the Colour of *Birds*, and the *Retardation* of *Hoarie-Hairs*. But of this see the Fifth Experiment.

Experiment
Solitary, touch-
ing the
Altering of the
Colour of
Hairs and
Feathers.
851

Experiment
Solitary, touch-
ing the Dif-
ferences of Li-
ving creatures,
Male, and Fe-
male.

852

THe Difference between *Male* and *Female*, in some *Creatures*, is not to be discerned; otherwise than in the *Parts of Generation* : As in *Horses* and *Mares*; *Dogs* and *Bitches*, *Doves* *He* and *She*, and others. But some differ in *Magnitude*, and that diversly : For in most the *Male* is the greater ; As in *Man*, *Pheasants*, *Peacocks*, *Turkies*, and the like : And in some few, as in *Hanks*, the *Female*. Some differ in the *Hair* and *Feathers*, both in the *Quantity*, *Crispation*, and *Colours* of them ; As *Hee-Lions*, are *Hirsute*, and have great *Mains* ; The *She's* are smooth like *Cats*. *Buls* are more *Crisp* upon the *Fore-head* than *Cows* ; The *Peacock*, and *Pheasant-Cock*, and *Gold-Finch-Cock*, have glorious and fine colours ; The *Hens* have not. Generally, the *Hees* in *Birds* have the fairest *Feathers*. Some differ in divers *Features* ; As *Bucks* have *Horns*, *Does* none ; *Rams* have more *wreathed Horns* than *Ewes* ; *Cocks* have great *Combs* and *Spurs*, *Hens* little or none ; *Boars* have great *Fangs*, *Sows* much less ; The *Turkey-Cock* hath great and swelling *Gills*, the *Hen* hath less ; *Men* have generally *Deeper* and *Stronger Voices* than *women*. Some differ in *Faculty* ; As the *Cock* amongst *Singing Birds*, are the best *Singers*. The *Chief Cause* of all these, (no doubt) is, for that the *Males* have more *Strength of Heat* than the *Females* ; Which appeareth manifestly in this, that all young *Creatures Males*, are like *Females* ; And so are *Eunuchs*, and *Gelt-Creatures* of all kinds, liker *Females*. Now *Heat* causeth *Greatness* of *Growth*, generally, where there is *Moisture* enough to work upon : But if there be found in any *Creature*, (which is seen rarely,) an *Over-great Heat* in proportion to the *Moisture*, in them the *Female* is the greater ; As in *Hanks*, and *Sparrows*. And if the *Heat* be ballanced with the *Moisture*, then there is no *Difference* to be seen between *Male* and *Female* : As in the *Instances* of *Horses*, and *Dogs*. We see also, that the *Horns* of *Oxen*, and *Cows*, for the most part, are *Larger* than the *Buls* ; which is caused by abundance of *Moisture*, which in the *Horns* of the *Bull* faileth. Again, *Heat* causeth *Pilosite*, and *Crispation* ; And so likewise *Beards* in *Men*. It also expelleth finer *Moisture*, which want of *Heat* cannot Expell ; And that is the *Cause* of the *Beauty* and *Variety* of *Feathers* : Again, *Heat* doth put forth many *Excrescences*, and much *Solid Matter*, which want of *Heat* cannot do : And this is the *Cause* of *Horns*, and of the *Greatness* of them ; And of the *Greatness* of the *Combs*, and *Spurs* of *Cocks*, *Gills* of *Turkey-Cocks*, and *Fangs* of *Boars*. *Heat* also dilateth the *Pipes*, and *Organs*, which causeth the *Deepness* of the *Voice*. Again, *Heat* refineth the *Spirits*, and that causeth the *Cock-Singing Bird*, to Excel the *Hen*.

Experiment
Solitary, touch-
ing the
Comparative
Magnitude of
Living crea-
tures.

853

THere be *Fishes* greater than any *Beasts* ; As the *whale* is far greater than the *Elephant*. And *Beasts* are (generally) greater than *Birds*. For *Fishes*, the Cause may be, that because they Live not in the *Air*, they have not their *Moisture* drawn, and Soaked by the *Air*, and *Sun-Beams*. Also they rest alwaies, in a manner, and are supported by the *water* ; Whereas *Motion* and *Labour* do consume. As for the *Greatness* of *Beasts*, more than of *Birds*, it is caused, for that *Beasts* stay longer time in the *womb*, than *Birds*, and there *Nourish*, and *Grow* : Whereas in *Birds*, after the *Egge* Lay'd, there is no further *Growth*, or *Nourishment* from the *Female* : For the *Sitting* doth *Virifie*, and not *Nourish*.

Experiment
Solitary, touch-
ing Exoffa-
tion of Fruits.

VVE have partly touched before the *Means* of *Producing Fruits*, without *Coars*, or *Stones*. And this we adde further, that the *Cause* must be *Abundance* of *Moisture* ; For that the *Coar*, and *Stone* are made of a *Drie Sap* :

Sap: And we see, that it is possible, to make a *Tree* put forth only in *Blossom*, without *Fruit*; As in *Cherries* with *Double Flowers*; Much more in *Fruit* without *Stones*, or *Coars*. It is reported, that a *Cions* of an *Apple*, grafted upon a *Colewort-stalk*, sendeth forth a great *Apple* without a *coar*. It is not unlikely, that if the *Inward Pith* of a *Tree*, were taken out, so that the *Juyce* came onely by the *Bark*, it would work the *Effect*. For it hath been observed, that in *Pollards*, if the *Water* get in on the *Top*, and they become *Hollow*, they put forth the more. We adde also, that it is delivered for certain by some, that if the *Cions* be grafted, the *Small Ends* downwards, it will make *Fruit* have little or no *coars*, and *stones*.

Tobacco is a thing of great Price, if it be in request. For an *Acre* of it will be worth, (as is affirmed) two Hundred Pounds, by the year, towards Charge. The Charge of making the Ground, and otherwise, is great, but nothing to the Profit. But the *English Tobacco* hath small credit, as being too *Dull*, and *Earthy*: Nay, the *Virginian Tobacco*, though that be in a *Hotter climate*, can get no credit for the same cause: So that a *Trial* to make *Tobacco* more *Aromatical*, and better *Concocted* here in *England*, were a Thing of great Profit. Some have gone about to do it, by *Drenching* the *English Tobacco*, in a *Decoction*, or *Infusion* of *Indian Tobacco*: But those are but *Sophistications*, and *Toyes*; For Nothing that is once *Perfect*, and hath runne his *Race*, can receive much *Amendment*. You must ever resort to the *Beginnings* of things for *Me'ioriation*. The *Way* of *Maturation* of *Tobacco* must, as in other *Plants*, be from the *Heat*, either of the *Earth*, or of the *Sunne*: We see some *Leading* of this in *Musk-Melons*; which are sown upon a *Hot Bed*, Duged below, upon a *Bank* turned upon the *South Sun*, to give *Heat* by *Reflection*; Laid upon *Tiles*, which increaseth the *Heat*; And Covered with *Straw*, to keep them from *Cold*. They remove them also, which addeth some *Life*: And by these *Helps* they become as good in *England*, as in *Italy*, or *Provence*. These and the like *Means*, may be tried in *Tobacco*. Enquire also of the *Steeping* of *Roots*, in some such *Liquor*, as may give them *Vigour* to put forth *Strong*.

Experiment
Solitary touching the
Melioration of
Tobacco.

855

Heat of the *Sun*, for the *Maturation* of *Fruits*; *Yea*, and the *Heat* of *Vivification* of *Living Creatures*, are both represented and supplied by the *Heat* of *Fire*; And likewise, the *Heats* of the *Sun*, and *Life*, are represented one by the other. *Trees*, set upon the *Backs* of *Chimneyes*, doe ripen *Fruit* sooner. *Vines*, that have been drawn in at the *Window* of a *Kitchen*, have sent forth *Grapes*, ripe a *Moneth* (at least) before others. *Stoves*, at the *Back* of *Walls*, bring forth *Orenges* here with us. *Egges*, as is reported by some, have been hatched in the warmth of an *Oven*. It is reported by the *Antients*, that the *Esrich* Layeth her *Egges* under *Sand*, where the *Heat* of the *Sunne* discloseth them.

Experiment
Solitary touching severall
Heats working
the same
Effects.

856

Barley in the *Boyling* swelleth not much; *wheat* swelleth more; *Rize* extreamly; Inasmuch as a *Quarter* of a *Pint* (unboyled) will arise to a *Pint* boyled. The cause (no doubt) is, for that the more *Close* and *Compact* the *Body* is, the more it will dilate: Now *Barley* is the most *Hollow*; *wheat* more *Solide* than that; and *Rize* most *Solid* of all. It may be also, that some *Bodies* have a kind of *Lentour*, and more *Depertible Nature* than others; As wee see it Evident in *Colouration*; for a *Small Quantity* of *Saffron*, will *Tinct* more, than a very great *Quantity* of *Bresill*, or *Wine*.

Experiment
Solitary touching
Swelling and Dilatation
in Boyling.

857

Experiment
Solitary touch-
ing the
Dulcoration of
Fruits.

858

Fruit groweth Sweet by Rowling, or Pressing them gently with the Hand; As Rowling Pears, Damascins, &c. By Rottenness; As Medlars, Services, Sloes, Heps, &c. By Time; As Apples, Wardens, Pomegranats, &c. By certain Special Maturations; As by Laying them in Hay, Straw, &c. And by Fire; As in Roasting, Stewing, Baking, &c. The Cause of the Sweetness by Rowling, and Pressing is, Emollition, which they properly enduce; as in Beating of Stock-Fish, Flesh, &c. By Rottenness is, for that the Spirits of the Fruit, by Putrefaction, gather Heat, and thereby digest the Harder Part: For in all Putrefactions there is a Degree of Heat. By Time and Keeping is, because the Spirits of the Body, doe ever feed upon the Tangible Parts, and attenuate them. By Several Maturations is, by some Degree of Heat. And by Fire is, because it is the proper Work of Heat to Refine, and to Incorporate; And all Soureness consisteth in some Grossness of the Body: And all Incorporation doth make the Mixture of the Body, more Equall, in all the Parts; Which eve enduceth a Milder Taste.

Experiment
Solitary touch-
ing Flesh
Edible, and
not Edible.

859

OF Fleshes, some are Edible; Some, except it be in Famine, not. As those that are not Edible, the Cause is, for that they have (commonly) too much Bitterness of Taste; And therefore those Creatures, which are Fierce and Cholerick, are not Edible; As Lions, Wolves, Squirrels, Dogs, Foxes, Horses, &c. As for Kine, Sheep, Goats, Deer, Swine, Conneyes, Hares, &c. We see they are Milde, and Fearfull. Yet it is true, that Horses, which are Beasts of Courage, have been, and are eaten by some Nations; As the Scythians were called Hippophagi; And the Chineses eat Horse-flesh at this day: And some Gluttons have used to have Colts-flesh baked. In Birds, such as are Carnivora, and Birds of Prey, are commonly no Good Meat; But the Reason is, rather the Cholerick Nature of those Birds, than their Feeding upon Flesh; For Puits, Gulls, Shovelers, Ducks, doe feed upon Flesh, and yet are good Meat. And we see, that those Birds which are of Prey, or feed upon Flesh, are good Meat, when they are very Young; as Hawkes, Rookes out of the Nest, Owles, &c. Mans Flesh is not Eaten. The Reasons are Three: First, because Men in Humanity doe abhorre it; Secondly, because no Living Creature, that Dyeth of it self, is good to Eat: And therefore the Canibals (themselves) eat no Mans Flesh, of those that Die of themselves, but of such as are Slain. The Third is, because there must be (generally) some Disparity, between the Nourishment, and the Body Nourished; And they must not be Overnear, or like: Yet we see, that in great Weaknesses, and Consumptions, Men have been sustained with womans Milk: And Picinus fondly (as I conceive) adviseth, for the Prolongation of Life, that a Vein be opened in the Arm of some wholesome Young Man; And the Bloud to be sucked. It is said, that Witches doe greedily eat Mans Flesh; which if it be true, besides a Devillish Appetite in them, it is likely to proceed, for that Mans Flesh may send up High and Pleasing Vapours, which may stirre the Imagination; And Witches Felicity is chiefly in Imagination, as hath been said.

Experiment
Solitary touch-
ing the
Salamander.

860

THere is an Antient Received Tradition of the Salamander, that it liveth in the Fire, and hath force also to extinguish the Fire. It must have two Things, if it be true, to this Operation, The One, a very Close Skin, whereby Flame, which in the Midst is not so hot, cannot enter: For we see that if the Palm of the Hand be annointed thick with white of Eggs, and then

then *Aquavita*, be poured upon it, and *Enflamed*, yet one may endure the *Flame* a pretty while. The other is some *Extreme Cold* and *Quenching Vertue*, in the *Body* of that *Creature* which choaketh the *Fire*. We see that *Milk* quencheth *wild fire* better than *Water*, because it entreth better.

Time doth change *Fruit*, (as *Apples*, *Pears*, *Pomgranats*, &c.) from more *Soure* to more *Sweet*: But contrariwise, *Liquors* (even those that are of the *Juyce* of *Fruit*,) from more *Sweet* to more *Soure*; As *Wort*, *Must*, *New-Verjuice*, &c. The *Cause* is, the *Congregation* of the *Spirits* together: For in both *Kinds*, the *Spirit* is attenuated by *Time*; But in the first *Kind*, it is more *Diffused*, and more mastered by the *Grosser parts*, which the *Spirits* do but digest: But in *Drinks* the *Spirits* do reign, and finding lesse *Opposition* of the *Parts*, become themselves more *Strong*; Which causeth also more *Strength* in the *Liquor*; Such, as if the *Spirits* be of the *Hotter* Sort, the *Liquor* becommeth apt to *Burn*; But in *Time*, it causeth likewise, when the *Higher Spirits* are *Evapourated*, more *Sourness*.

Experiment
Solitarie tou-
ching the Con-
trary Operations
of Time,
upon Fruits
and Liquors.

861

It hath been observed by the *Antien's*, that *Plates* of *Metall*, and especially of *Brasse*, applyed presently to a *Blow*, will keep it down from *Swelling*. The *Cause* is *Repercussion*, without *Humectation*, or *Entrance* of any *Body*: for the *Plate* hath only a *Virtuall Cold*, which doth not search into the *Hurt*: Whereas all *Plasters* and *Ointments* do enter. Surely, the *Cause* that *Blows* and *Bruises* induce *Swellings* is, for that the *Spirits* resorting to *Succour* the *Part* that *Labourerth*, draw also the *Humours* with them: For we see, that it is not the *Repulse*, and the *Return* of the *Humour* in the *Part Strucken*, that causeth it; For that *Gouts*, and *Tooth-Aches* cause *Swelling*, where there is no *Percussion* at all.

Experiment
Solitarie, tou-
ching Blows
and Bruises.

862.

The *Nature* of the *Orris Root*, is almost *Singular*; for there be few *Odo-riferous Roots*; and in those that are in any degree, *Sweet*, it is but the same *Sweetness* with the *Wood* or *Leaf*: But the *Orris* is not *Sweet* in the *Leaf*; Neither is the *Flower* any thing so *Sweet* as the *Root*. The *Root* seemeth to have a *Tender dainty Heat*, which when it commeth above *Ground*, to the *Sun*, and the *Air*, vanisheth: For it is a great *Mollifier*; And hath a *Smell* like a *Violet*.

Experiment
Solitary, tou-
ching the
Orris Root.

863.

It hath been observed by the *Antien's*, that a great *Vessel* full, drawn into *Bottles*; and then the *Liquor* put again into the *Vessel*, will not fill the *Vessel* again, so full as it was, but that it may take in more *Liquor*: And that this holdeth more in *Wine*, than in *Water*. The *Cause* may be *Triviall*; Namely, by the *Expence* of the *Liquor*, in regard some may stick to the *Sides* of the *Bottles*: But there may be a *Cause* more *Subtill*; Which is, that the *Liquor* in the *Vessel*, is not so much *Compressed*, as in the *Bottle*; Because in the *Vessel*, the *Liquor* meeteth with *Liquor* chiefly: But in the *Bottles* a *Small Quantity* of *Liquor*, meeteth with the *Sides* of the *Bottles*, which *Compress* it so, that it doth not *Open* again.

Experiment
Solitary, tou-
ching the
Compression of
Liquors.

864.

Water, being contiguous with *Aire*, Cooleth it, but *Moisteneth* it not, except it *Vapour*. The *Cause* is, for that *Heat* and *Cold* have a *Virtual Transfession*, without *Communication* of *Substance*; but *Moisture* not: And to all *Madefaction* there is required an *Imbibition*: But where the *Bodies* are of such severall *Levitie*, and *Gravity*, as they *Mingle* not, they can follow

Experiment
Solitary, tou-
ching the
working of
Water upon
Air contiguous.

865.

no

Experiment
Solitary, touch-
ing the
Nature of
Air.

866

no *Imbibition*. And therefore, *Oyl* likewise lyeth at the *Top* of the *Water*, without *Commixture*: And a *Drop* of *Water*, running swiftly over a *Straw*, or *Smooth Body*, wetteth not.

Star-Light Nights, yea, and bright *Moon-shine Nights*, are *Colder* than *Cloudy Nights*. The *Cause* is, the *Driness* and *Fineness* of the *Air*, which thereby becommeth more *Piercing*, and *Sharp*: And therefore *Great Continents* are colder than *Islands*: And as for the *Moon*, though it self inclineth the *Air* to *Moisture*, yet when it shineth bright, it argueth the *Air* is dry. Also *Close Air* is warmer than *Open Air*; which (it may be) is, for that the true *Cause* of *Cold*, is an *Expiration* from the *Globe* of the *Earth*, which in open *Places* is stronger: And again, *Air* it self, if it be not altered by that *Expiration*, is not without some *Secret Degree* of *Heat*: As it is not likewise without some *Secret Degree* of *Light*: For otherwise *Cats*, and *Owls*, could not see in the *Night*; But that *Air* hath a little *Light*, Proportionable to the *Visual Spirits* of those *Creatures*.

Experiments
in Confort,
touching the
Eyes, and
Sight.

867

The *Eyes* doe move one and the same way; For when one *Eye* moveth to the *Nostrill*, the other moveth from the *Nostrill*. The *Cause* is *Motion of Consent*, which in the *Spirits*, and *Parts Spirituall*, is Strong. But yet *Pse* will induce the Contrary: For some can *Squint*, when they will: And the Common *Tradition* is, that if *Children*, be set upon a *Table*, with a *Candle* behind them, both *Eyes* will move *Outwards*; As affecting to see the *Light*, and so induce *Squinting*.

868

We see more exquisitely with *One Eye Shut*, than with *Both Open*. The *Cause* is, for that the *Spirits Visual* unite themselves more, and so become Stronger. For you may see, by looking in a *Glass*, that when you shut one *Eye*, the *Pupil* of the other *Eye*, that is *Open*, Dilateth.

869

The *Eyes*, if the *Sight* meet not in one *Angle*, See *Things Double*. The *Cause* is, for that *Seeing* two *Things*, and *Seeing* one *Thing* twice, worketh the same effect: And therefore a little *Pellet*, held between two *Fingers*, laid a cross, seemeth *Double*.

870

Pore-Blind Men, see best in the *Dimmer Light*; And likewise have their *Sight* stronger near hand, than those that are not *Pore-blind*; And can Read and Write smaller *Letters*. The *Cause* is, for that the *Spirits Visual*, in those that are *Pore-blind*, are Thinner, and Rarer, than in others; And therefore the Greater *Light* disperseth them. For the same *Cause* they need *Contracting*; But being *Contracted*, are more strong, than the *Visual Spirits* of Ordinary *Eyes* are; As when we see thorough a *Level*, the *Sight* is the Stronger: And so is it, when you gather the *Eye-lids* somewhat close: And it is commonly seen in those that are *Pore-blind*, that they doe much gather the *Eye-lids* together. But *Old Men*, when they would see to Read, put the *Paper* somewhat a far off. The *Cause* is, for that *Old Mens Spirits Visual*, contrary to those of *Pore-blind Men*, unite not, but when the *Object* is at some good distance, from their *Eyes*.

871

Men see better, when their *Eyes* are over-against the *Sun*, or a *Candle*, if they put their *Hand* a little before their *Eye*. The Reason is, for that the *Glaring* of the *Sun*, or the *Candle*, doth weaken the *Eye*; whereas the *Light Circumsufed* is enough for the *Perception*. For we see, that an *Over-Light* maketh the *Eyes Dazel*; Insomuch as Perpetual Looking against the *Sun*, would Cause *Blindness*. Again, if *Men* come out of a *Great Light*, into a *Dark Room*; And contrariwise, if they come out of a *Dark Room*, into a

Light

Light Room, they seem to have a *Mist* before their *Eyes*, and see worse than they shall do after they have stayed a little while, either in the *Light*, or in the *Dark*. The *Cause* is, for that the *Spirits Visual*, are upon a sudden Change disturbed, and put out of Order; And till they be recollected, doe not perform their Function well. For when they are much *Dilated* by *Light*, they cannot *Contract* suddenly; And when they are much *Contracted* by *Darkness*, they cannot *Dilate* suddenly. And Excess of both these, (that is, of the *Dilatation*, and *Contraction* of the *Spirits Visual*) if it be long, Destroyeth the *Eye*. For as long looking against the *Sun*, or *Fire*, hurteth the *Eye* by *Dilatation*, so *Curious Painting* in *Small Volumes*, and *Reading* of *Small Letters*, doe hurt the *Eye* by *Contraction*.

It hath been observed, that in *Anger* the *Eyes* wax *Red*; And in *Blushing*, not the *Eyes*, but the *Ears*, and the *Parts* behind them. The *Cause* is, for that in *Anger*, the *Spirits* ascend and wax *Eager*; Which is most easily seen in the *Eyes*, because they are *Translucide*; Though withall it maketh both the *Cheeks*, and the *Gills Red*; But in *Blushing*, it is true, the *Spirits* ascend likewise to *Succour*, both the *Eyes* and the *Face*, which are the *Parts* that labour: But when they are repulsed by the *Eyes*, for that the *Eyes*, in *Shame* doe put back the *Spirits*, that ascend to them, as unwilling to look abroad: For no *Man*, in that *Passion*, doth look strongly, but dejectedly; And that *Repulsion* from the *Eyes*, Diverteth the *Spirits* and *Heat* more to the *Ears*, and the *Parts* by them.

872

The *Objects* of the *Sight*, may cause a great *Pleasure*, and *Delight* in the *Spirits*, but no *Pain*, or great *Offence*; Except it be by *Memory*, as hath been said. The *Glimpses* and *Beams* of *Diamonds* that strike the *Eye*; *Indian Feathers*, that have glorious *Colours*, the *Comming* into a *Fair Garden*, the *Comming* into a *Fair Room* richly furnished; A *Beautifull Person*; And the like; do delight and exhilarate the *Spirits* much. The *Reason*, why it holdeth not in the *Offence*, is, for that the *Sight* is most *Spiritual* of the *Senses*; whereby it hath no *Object* Gross enough to offend it. But the *Cause* (chiefly) is, for that there be no *Active Objects* to offend the *Eye*. For *Harmonical Sounds*, and *Discordant Sounds*, are both *Active* and *Positive*: So are *Sweet Smells*, and *Stinks*: So are *Bitter*, and *Sweets*, in *Tastes*: So are *Over-Hot*, and *Over-Cold*, in *Touch*: But *Blackness*, and *Darkness*, are indeed but *Privatives*; And therefore have little or no *Activity*. Somewhat they doe *Contristate*, but very little.

873

Water of the *Sea*, or otherwise, looketh *Black*er when it is moved, and *Whiter* when it resteth. The *Cause* is, for that by means of the *Motion*, the *Beams* of light pass not *Straight*, and therefore must be darkened; whereas when it resteth, the *Beams* do pass *Straight*. Besides, *Splendour* hath a *Degree* of *Whiteness*; Especially if there be a little *Repercussion*: For a *Looking-Glass* with the *Steel* behind, looketh *Whiter* than *Glass Simple*. This *Experiment* deserveth to be driven further, in *Trying* by what Means *Motion* may hinder *Sight*.

Experiment
Solitary, touching the
Colour of the
Sea, or other
Water.

874

Shell-Fish have been by some of the *Antients*, compared and sorted with the *Insecta*; But I see no reason why they should; For they have *Male*, and *Female*, as other *Fish* have: Neither are they bred of *Putrefaction*; Especially such as doe Move. Nevertheless it is certain, that *Oysters*, and *Cockles*, and *Mussels*, which move not, have not discriminate *Sex*. *Quære* in what time, and how they are bred? It seemeth that *Shells* of *Oysters* are bred where none

Experiment
Solitary, touching
Shel-fish.
875

none were before; And it is tried, that the great *Horse-Muscle*, with the fine shēl, that breedeth in *Ponds*, hath bred within thirty years: But then, which is strange, it hath been tried, that they doe not onely Gape and Shut, as the *Oysters* do, but Remove from one Place to Another.

Experiment
Solitary, touch-
ing the
Right Side and
the Left.

876

THe *Senses* are alike Strong, both on the *Right Side*, and on the *Left*; But the *Lims* on the *Right Side* are Stronger. The *Cause* may be, for that the *Brain*, which is the *Instrument* of *Sense*, is alike on both *Sides*; But *Motion*, and *Habillities* of *Moving*, are somewhat holpen from the *Liver*, which lieth on the *Right-Side*. It may be also, for that the *Senses* are put in *Exercise*, indifferently on both *Sides* from the Time of our Birth; But the *Lims* are used most on the *Right-Side*, whereby *Custom* helpeth: For wee see, that some are *Left-Handed*; Which are such as have used the *Left-Hand* most.

Experiment
Solitary, touch-
ing *Frictions*.

877

F*rictions* make the *Parts* more *Fleshie*, and *Full*: As we see both in *Men*; And in the *Currying* of *Horses*, &c. The *Cause* is, for that they draw greater *Quantity* of *Spirits* and *Bloud* to the *Parts*: And again, because they draw the *Aliment* more forcibly from within: And again, because they relax the *Pores*, and so make better *Passage* for the *Spirits*, *Bloud*, and *Aliment*: Lastly, because they dissipate, and digest any *Inutile*, or *Excrementitious Moisture*, which lyeth in the *Flesh*: All which help *Assimilation*. *Frictions* also doe more *Fill*, and *Impinguate* the *Body*, than *Exercise*. The *Cause* is, for that in *Frictions*, the *Inward Parts* are at rest; Which in *Exercise* are beaten (many times) too much: And for the same Reason (as we have noted heretofore) *Gally-Slaves* are *Fat* and *Fleshie*, because they stir the *Lims* more, and the *Inward Parts* less.

Experiment
Solitary, touch-
ing *Globes* ap-
pearing
Flat at *Dis-
tance*.

878

ALL *Globes* a far off appear *Flat*. The *Cause* is, for that *Distance*, being a *Secondary Object* of *Sight*, is not otherwise discerned, than by more or less *Light*; which *Disparity* when it cannot be discerned, all seemeth *One*: As it is (generally) in *Objects* not distinctly discerned; For so *Letters*, if they be so far off, as they cannot be discerned, shew but as *Dusky Paper*: And all *Engravings*, and *Embossings*, (a far off) appear *Plain*.

Experiment
Solitary, touch-
ing *Shadows*.

879

THe *Vitermost Parts* of *Shadows* seem ever to *Tremble*. The *Cause* is, for that the little *Moats*, which we see in the *Sun*, do ever Stir, though there be no *Wind*; And therefore those *Moving*, in the Meeting of the *Light* and the *Shadow*, from the *Light* to the *Shadow*, and from the *Shadow* to the *Light*, doe shew the *Shadow* to Move, because the *Medium* Moverh.

Experiment
Solitary, touch-
ing the
Rowling and
Breaking of the
Seas.

880

Shallow, and *Narrow Seas*, break more than *Deep*, and *Large*. The *Cause* is, for that the *Impulsion* being the same in Both; where there is a greater *Quantity* of *Water*, and likewise Space Enough, there the *water* Rowleth, and Moverh, both more Slowly, and with a Sloper Rise, and Fall: But where there is less *water*, and less Space, and the *water* dasheth more against the bottom; there it moveth more Swiftly, and more in *Precipice*; For in the *Breaking* of the *Waves* there is ever a *Præcipice*.

Experiment
Solitary, touch-
ing the
Dilcoloration of
Salt-water.

881

IThath been observed by the *Antients*, that *Salt-water* Boyled, or Boyled and Cooled again, is more *Potable*, than of it self *Raw*: And yet the *Taste* of *Salt*, in *Distillations* by *Fire*, riseth not; For the *Distilled water* will be *Fresh*.

Fresh. The Cause may be, for that the *Salt Part* of the *Water*, doth partly rise into a *Kind* of *Scum* on the *Top*; And partly goeth into a *Sediment* in the *Bottom*: And so is rather a *Separation*, than an *Evaporation*. But it is too gross to rise into a *Vapour*: And so is a *Bitter Taste* likewise: For *Simple Distilled Waters* of *Wormwood*, and the like, are not *Bitter*.

It hath been set down before, that *Pits* upon the *Sea-shore*, turn into *Fresh Water*, by *Percolation* of the *Salt* through the *Sand*: But it is further noted, by some of the *Antients*, that in some *Places* of *Africk*, after a time, the *Water* in such *Pits* will become *Brackish* again. The Cause is, for that after a time, the very *Sands*, through which the *Salt-water* passeth, become *Salt*; And so the *Strainer* it self is tainted with *Salt*. The Remedy therefore is to dig still *New Pits*, when the old wax *brackish*, as if you would change your *Strainer*.

It hath been observed by the *Antients*, that *Salt water*, will dissolve *Salt* put into it, in less time, than *Fresh Water* will dissolve it. The Cause may be, for that the *Salt* in the *Precedent Water*, doth, by *Similitude* of *Substance*, draw the *Salt* new put in, unto it, Whereby it diffuseth in the *Liquor* more speedily. This is a *Noble Experiment*, if it be true; For it sheweth Means of more *Quick* and *Easie Infusions*; And it is likewise a good *Instance* of *Attraction* by *Similitude* of *Substance*. Try it with *Sugar* put into *Water*, formerly *Sugred*; And into other *Water* *Unsugred*.

Put *Sugar* into *Vine*, part of it above, part under the *Vine*; And you shall find, (that which may seem strange) that the *Sugar* above the *Vine*, will soften and dissolve sooner, than that within the *Vine*. The Cause is, for that the *Vine* entreateth that part of the *Sugar* which is under the *Vine*, by *Simple Infusion*, or *Spreading*; But that part above the *Vine* is likewise forced by *Sucking*: For all spongie *bodies* expell the *Air*, and draw in *Liquor*, if it be *Contiguous*; As we see it also in *Sponges*, put part above the *Water*. It is worthy the *Inquirie*, to see how you may make more *Accurate Infusions*, by Help of *Attraction*.

Water in *Wells* is *Warmer* in *Winter* than in *Summer*: And so *Air* in *Caves*. The Cause is, for that in the *Higher Parts*, under the *Earth*, there is a *Degree* of some *Heat*; (As appeareth in *Sulphureous Veins*, &c.) Which shut close in, (as in *Winter*) is the *More*; But if it *Perspire*, (as it doth in *Summer*) it is the *less*.

It is reported, that amongst the *Leucadians*, in *Antient* time, upon a *Superstition* they did use to *Precipitate* a *Man* from a *High Cliff* into the *Sea*; Tying about him with *Strings*, at some distance, many great *Fowls*; And fixing unto his *Body* divers *Feathers*, spread, to break the *Fall*. Certainly many *Birds* of good *Wing* (As *Kites*, and the like) would bear up a good weight, as they fly; And *Spreading* of *Feathers* thin and close, and in great breadth, will likewise bear up a great weight; being even layd, without *Tilting* upon the *Sides*. The further *extension* of this *Experiment* for *Flying* may be thought upon.

There is in some *Places*, (namely in *Cephalonia*,) a little *Shrub*, which they call *Holy-Oak*, or *Dwarf-Oak*: Upon the *leaves* whereof there riseth

Experiment
Solitary, touching the
Return of Saltnes
in Pits upon
the Sea-shore.
882

Experiment
Solitary, touching
Attraction by Simi-
litude of Sub-
stance.
883

Experiment
Solitary, touch-
ing Attraction.
884

Experiment
Solitary, touch-
ing Heat
under Earth.
885

Experiment
Solitary, touch-
ing Flying
in the Air.
886

Experiment
Solitary, touch-
ing the Dye
of Scarlet.
887

seth a *Tumour*, like a *Blister*; Which they gather, and rub out of it, a certain *Red Dust*, that converteth (after a while) into *worms*, which they kill with *wine*, (as is reported) when they begin to *Quicken*: With this *Dust* they die *Scarlet*.

Experiment
Solitary, touch-
ing the *Motion*
of the *Water*
by the *Flame*, raised
1888
1888

IN *Zant*, it is very ordinary, to make *Men Impotent*, to accompany with their *wives*. The like is Practised in *Gasconie*, Where it is called *Nover l'equille*. It is practised alwaies upon the *wedding Day*. And in *Zant*, the Mothers themselves do it, by way of Prevention; Because thereby they hinder other *Charms*; and can undoe their Own. It is a Thing the *Civil Law* taketh knowledge of; And therefore is of no *Light Regard*.

Experiment
Solitary, touch-
ing the
Rise of *water*
by the *Motion*
of the *Flame*, raised
1888
1888

IT is a Common *Experiment*, but the *Cause* is mistaken. Take a *Pot*, (Or better a *Glass*, because therein you may see the *Motion*;) And set a *Candle* lighted in the *Bottom* of a *Bason* of *water*; And turn the *Mouth* of the *Pot*, or *Glass*, over the *Candle*, and it will make the *water* rise. They ascribe it to the *Drawing* of *Heat*; Which is not true: For it appeareth plainly to be but a *Motion* of *Nexe*, which they call *Ne detur vacuum*; And it proceedeth thus. The *Flame* of the *Candle*, as soon as it is covered, being suffocated by the *Close Air*, lesseneth by little and little: During which time, there is some little *Ascent* of *water*, but not much: For the *Flame* Occupying less and less *Room*, as it lesseneth, the *water* succeedeth. But upon the *Instant* of the *Candles Going out*, there is a sudden *Rise* of a great deal of *water*; For that that the *Body* of the *Flame* filleth no more *Place*; And so the *Air*, and the *water* succeed. It worketh the same *Effect*, if instead of *water*, you put *Flower*, or *Sand*, into the *Bason*. Which sheweth, that it is not the *Flames* *Drawing* the *Liquor*, as *Nourishment*; As it is supposed; For all *Bodies* are alike unto it; As it is ever in *Motion* of *Nexe*; Inasmuch as I have seen the *Glass*, being held by the *Hand*, hath lifted up the *Bason*, and all: The *Motion* of *Nexe* did so Clasp the *Bottom* of the *Bason*. That *Experiment*, when the *Bason* was lifted up, was made with *Oyl*, and not with *water*: Nevertheless this is true, that at the very first *Setting* of the *Mouth* of the *Glass*, upon the *Bottom* of the *Bason*, it draweth up the *water* a little, and then standeth at a *Stay*, almost till the *Candles Going out*, as was said. This may shew some *Attraction* at first: But of this we will speak more, when we handle *Attractions* by *Heat*.

Experiments
In Consort,
touching the
Influences of
the *Moon*,
1888
1888

Of the *Power* of the *Celestial Bodies*, and what more Secret *Influences* they have, besides the two Manifest *Influences* of *Heat*, and *Light*, VVe shall speak, when we handle *Experiments* touching the *Celestial Bodies*: Mean-while, we will give some *Directions* for more certain *Trials*, of the *Vertue* and *Influences* of the *Moon*, which is our *Nearest Neighbour*.

The *Influences* of the *Moon*, (most observed,) are Four; The *Drawing forth* of *Heat*: The *Inducing* of *Putrefaction*: The *Increase* of *Moisture*: The *Exciting* of the *Motions* of *Spirits*.

890

For the *drawing forth* of *Heat*, we have formerly prescribed to take *Water warm*, and to set part of it against the *Moon-beams*, and part of it with a *Screen* between, and to see whether that which standeth exposed to the *Beams* will not cook sooner. But because this is but a small *interposition*, (though in the *Sun* we see a small *Shade* doth much) it were good to try it when the *Moon* shineth, and when the *Moon* shineth not at all; and with *Water warm* in a *Glass-bottle* as well as in a *Dish*, and with *Cinders*, and with *Iron-red-hot*, &c.

891

For the *inducing* of *Putrefaction*, it were good to try it with *Flesh* or *Fish* exposed to the *Moon-beams*, and again exposed to the *Air* when the *Moon* shineth not, for the like time, to see whether will corrupt sooner; and try it also with *Capon*, or some other *Fowl* laid abroad, to see whether it will mortify and become tender sooner. Try it also with dead *Flies* or dead *Worms*, having a little *Water* cast upon them, to see whether will putrefie sooner. Try it also with an *Apple* or *Orange*, having *holes* made in their *tops*, to see whether will rot or mould sooner. Try it also with *Holland-cheese*; having *Wine* put into it; whether it will breed *Mites* sooner or greater.

892

For the *increase* of *Moisture* the Opinion received is, that *Seeds* will grow soonest, and *Hair*, and *Nails*, and *Hedges*, and *Herbs*, cut, &c. will grow soonest, if they be set or cut in the *Increase* of the *Moon*: also that *Brains* in *Rabbits*, *Wood-cocks*, *Calves*, &c. are fullest in the *Full* of the *Moon*; and so of *Marrow* in the *Bones*; and so of *Oysters* and *Coockles*; which of all the rest are the easiest tried, if you have them in *Pits*.

893

Take some *Seeds* or *Roots* (as *Onions*, &c.) and set some of them immediately after the *Change*, and others of the same kind immediately after the *Full*: let them be as like as can be, the *Earth* also the same as near as may be; and therefore best in *Pots*: let the *Pots* also stand where no *Rain* or *Sun* may come to them, lest the *difference* of the *weather* confound the *Experiment*. And then see in what time the *Seeds* Set in the *Increase* of the *Moon* come to a certain height; and how they differ from those that are Set in the *Decrease* of the *Moon*.

894

It is like that the *Brain* of *Man* waxeth moister and fuller upon the *Full* of the *Moon*: and therefore it were good for those that have moist *Brains*, and are great *Drinkers*, to take *Fume* of *Lignum Aloes*, *Rosemary*, *Frankincense*, &c. about the *Full* of the *Moon*. It is like also, that the *Humors* in *Mens Bodies* increase and decrease as the *Moon* doth: and therefore it were good to purge some day or two after the *Full*, for that then the *Humors* will not replenish so soon again.

895

As for the *exciting* of the *motion* of the *Spirits*, you must note that the *growth* of *Hedges*, *Herbs*, *Hair*, &c. is caused from the *Moon*, by *exciting* of the *Spirits*, as well as by *increase* of the *Moisture*. But for *Spirits* in particular, the great instance is in *Lunacies*.

896

There may be other secret *Effects* of the *Influence* of the *Moon*, which are not yet brought into *observation*. It may be that if it so fall out that the *Wind* be *North* or *North-East*, in the *Full* of the *Moon*, it increaseth *Cold*; and if *South* or *South-West*, it disposeth the *Air* for a good while to *Warmth* and *Rain*: which would be observed.

897

It may be that *Children* and *young Cattel* that are brought forth in the *Full* of the *Moon* are stronger and larger then those that are brought forth in the *Wane*; and those also which are begotten in the *Full* of the *Moon*: So that it might be good *Husbandry* to put *Ramms* and *Bulls* to their

Females somewhat before the *Full* of the *Moon*. It may be also that the *Eggs* laid in the *Full* of the *Moon* breed the better *Birds*: and a number of the like *Effects*, which may be brought into *Observation*. *Quare* also, whether great *Thunders* and *Earth-quakes* be not most in the *Full* of the *Moon*.

Experiment
Solitary touch-
ing *Vinegar*.
898

THe turning of *Wine* to *Vinegar* is a kind of *putrefaction*: and in making of *Vinegar* they use to set *Vessels* of *Wine* over against the *Noon-Sun*; which calleth out the more *Oily Spirits*, and leaveth the *Liquor* more *sour* and *hard*. We see also, that *Burnt-Wine* is more *hard* and *astringent* than *Wine un-burnt*. It is said, that *Cider* in *Navigations* under the *Line* ripeneth, when *Wine* or *Beer* soureth. It were good to set a *Rundles* of *Verjuice* over against the *Sun* in *Summer*, as they do *Vinegar*, to see whether it will ripen and sweeten.

Experiment
Solitary touch-
ing *Creatures*
that sleep all
Winter.
899

THere be divers *Creatures* that sleep all *Winter*, as the *Bear*, the *Hedgehog*, the *Bat*, the *Bee*, &c. these all wax *fat* when they sleep, and egest not. The cause of their *Fattening*, during their *sleeping-time*, may be the want of *Assimilating*; for whatsoever *assimilates* not to *Flesh*, turneth either to *Sweat* or *Fat*. These *Creatures*, for part of their *sleeping-time*, have been observed not to *stir* at all; and for the other part, to *stir*, but not to *remove*: and they get warm and close places to sleep in. When the *Flemmings* Wintred in *Nova Zembla*, the *Bears* about the middle of *November* went to sleep; and then the *Foxes* began to come forth, which durst not before. It is noted by some of the *Antients*, that the *She-Bear* breedeth and lyeth in with her *Young* during that time of *Rest*, and that a *Bear big with young* hath seldom been seen.

Experiment
Solitary touch-
ing the *Gene-
ration* of *Crea-
tures* by *Copu-
lating*, and by
Putrefaction.
900

Some living creatures are procreated by *Copulation* between *Male* and *Female*, some by *Putrefaction*; and of those which come by *Putrefaction*, many do (nevertheless) afterwards procreate by *Copulation*. For the cause of both *Generations*: First, it is most certain, that the cause of all *Vivification* is a gentle and proportionable *Heat*, working upon a glutinous and yielding *Substance*: for the *Heat* doth bring forth *Spirit* in that *Substance*; and the *Substance* being glutinous produceth two effects; the one, that the *Spirit* is detained and cannot break forth; the other, that the *Matter* being gentle and yielding, is driven forwards by the motion of the *Spirits*, after some swelling into *Shape* and *Members*. Therefore all *Sperm*, all *Menstruous Substance*, all *Matter* whereof *Creatures* are produced by *Putrefaction*, have evermore a *Closeness*, *Lentour*, and *Sequacity*. It seemeth therefore that the *Generation* by *Sperm* onely, and by *Putrefaction*, have two different causes. The first is, for that *Creatures* which have a definite and exact *Shape* (as those have which are procreated by *Copulation*) cannot be produced by a weak and casual *Heat*; nor out of *Matter* which is not exactly prepared according to the *Species*. The second is, for that there is a greater time required for *Maturation* of perfect *Creatures*; for if the time required in *Vivification* be of any length, then the *Spirit* will exhale before the *Creature* be mature; except it be inclosed in a place where it may have continuance of the *Heat*, access of some *Nourishment* to maintain it, and *Closeness* that may keep it from exhaling. And such places

Places, or the Wombs and Matrices of the Females. And therefore all Creatures made of Putrefaction are of more uncertain Shape, and are made in shorter time, and need not so perfect an Enclosure, though some Closeness be commonly required. As for the Heathen Opinion, which was, that upon great Mutations of the World, perfect Creatures were first ingendred of Concretion, as well as Frogs, and Worms, and Flies, and such like, are now; we know it to be vain: but if any such thing should be admitted, discoursing according to sense, it cannot be, except you admit of a Chaos first, and commixture of Heaven and Earth; for the Frame of the World once in order, cannot effect it by any Excess or Casualty.

of the Number and Manner of the Females. And therefore all Cre-
tures made of Intuition are of more uncertain Shape, and are made
in fewer Time, and need not be put in an Intuition, though some Clasp
may be commonly required. As for the Human Opinion, which was, that
upon great Alterations of the World, perfect Creatures were first ingendered
of Generation, as well as Frogs and Trees, and Fish, and such like, are
now, we know it to be vain: but if any such thing should be admitted,
discussing according to Sense, I cannot be, except you admit of a Change
first, and continuance of Heavens and Earth, for the Reason of the World once
in order, cannot effect it by any new or Casualty.

NATURAL

82

NATURAL HISTORY,

Century X.



THE Philosophy of Pythagoras (which was full of Superstition) did first plant a monstrous Imagination, which afterwards was, by the School of Plato and others , watered and nourished : It was , That the World was One Entire Perfect Living Creature : Insomuch as Apollonius of Tyana, a Pythagorean Prophet, affirmed, That the Ebbing and Flowing of the Sea was the Respiration of the World, drawing in Water as Breath, and putting it forth again. They went on, and inferred , That if the World were a Living Creature, it had a Soul and Spirit ; which also they held , calling it Spiritus Mundi , the Spirit or Soul of the World : by which they did not intend God, (for they did admit of a Deity besides) but onely the Soul, or Essential Form of the Universe. This Foundation being laid, they might build upon it what they would ; for in a Living Creature, though never so great , (as for example, in a great Whale) the Sense and the Affects of any one Part of the Body instantly make a Transcursion throughout the whole Body : So that by this they did insinuate, that no Distance of Place , nor Want or Indisposition of Matter , could hinder Magical Operations ; but that (for example) we might here in Europe have Sense and Feeling of that which was done

Experiments in
Consort touch-
ing Transmissi-
on and Influx of
Immaterial
Virtues, and
the Force of
Imagination.

in China; and likewise we might work any *Effect* without and against *Matter*: and this not holden by the *Co-operation* of *Angels* or *Spirits*, but onely by the *Unity* and *Harmony* of *Nature*. There were some also that staid not here, but went further, and held, That if the *Spirit* of *Man* (whom they call the *Microcosm*) do give a fit touch to the *Spirit* of the *World* by strong *Imaginations* and *Beliefs*, it might command *Nature*; for *Paracelsus*, and some darksome *Authors* of *Magick*, do ascribe to *Imagination* Exalted the *Power* of *Miracle-working Faith*. With these vast and bottomless *Follies* Men have been (in part) entertain'd.

But we, that hold firm to the *Works* of *God*, and to the *Sense*, which is *God's Lamp*, (*Lucerna Dei Spiraculum Hominis*) will enquire with all *Sobriety* and *Severity*, whether there be to be found in the *Foot-steps* of *Nature* any such *Transmission* and *Influx* of *Immaterial Virtues*; and what the *Force* of *Imagination* is, either upon the *Body Imaginant*, or upon another *Body*: Wherein it will be like that *Labour* of *Hercules* in *Purging* the *Stable* of *Augeas*, to separate from *Superstitious* and *Magical Arts* and *Observations*, any thing that is clean and pure *Natural*, and not to be either *Contemned* or *Condemned*. And although we shall have occasion to speak of this in more places then one, yet we will now make some *Entrance* thereinto.

Experiments in
Confort Moni-
tory, touching
Transmission of
Spirits, and the
Force of Imagi-
nation.

901

MEN are to be admonished, that they do not with-draw credit from the *Operations* by *Transmission* of *Spirits* and *Force* of *Imagination*, because the *Effects* fail sometimes. For as in *Infection* and *Contagion* from *Body* to *Body*, (as the *Plague*, and the like) it is most certain that the *Infection* is received (many times) by the *Body passive*, but yet is by the *strength* and good *disposition* thereof repulsed, and wrought out, before it be formed into a *Disease*; so much more in *Impressions* from *Mind* to *Mind*, or from *Spirit* to *Spirit*, the *Impression* taketh, but is encountred and overcome by the *Mind* and *Spirit*, which is *passive*, before it work any manifest *Effect*: And therefore they work most upon *weak Minds* and *Spirits*; as those of *Women*, *Sick Persons*, *Superstitious* and *Fearful Persons*, *Children* and *young Creatures*.

Nescio quis teneros oculus mihi fascinat Agnos:

The *Poet* speaketh not of *Sheep*, but of *Lambs*. As for the *weakness* of the *Power* of them upon *Kings* and *Magistrates*, it may be ascribed (besides the main, which is the *Protection* of *God* over those that execute his Place) to the *weakness* of the *Imagination* of the *Imaginant*; for it is hard for a *Witch* or a *Sorcerer* to put on a *Belief* that they can hurt such *Persons*.

902

Men are to be admonished, on the other side, that they do not easily give Place and Credit to these *Operations* because they succeed many times:

For

For the Cause of this Success is (oft) to be truly ascribed unto the Force of Affection and Imagination upon the Body Agent, and then by a Secondary Means it may work upon a diverse Body. As for Example, If a man carry a Planet's Seal, or a Ring, or some part of a Beast, believing strongly that it will help him to obtain his Love, or to keep him from danger of hurt in Fight, or to prevail in a Sute, &c. it may make him more Active and Industrious, and again, more Confident and Persisting, then otherwise he would be. Now the great Effects that may come of Industry and Perseverance (especially in Civil Business) who knoweth not: for we see Audacity doth almost bind and mate the weaker sort of Minds; and the State of Humane Actions is so variable, that to triethings oft, and never to give over, doth wonders: Therefore it were a mere Fallacy and Mistaking to ascribe that to the Force of Imagination upon another Body, which is but the Force of Imagination upon the proper Body: for there is no doubt but that Imagination and vehement Affection work greatly upon the Body of the Imaginant, as we shall shew in due place.

Men are to be admonished, that as they are not to mistake the Causes of these Operations, so much less they are to mistake the Fact or Effect, and rashly to take that for done which is not done. And therefore, as divers wise Judges have prescribed and cautioned, Men may not too rashly believe the Confession of Witches, nor yet the Evidence against them: for the Witches themselves are Imaginative, and believe oft-times they doe that which they doe not; and People are credulous in that point, and ready to impute Accidents and Natural Operations to Witchcraft. It is worthy the observing, that both in ancient and late times, (as in the Thessalian Witches, and the meetings of Witches that have been recorded by so many late Confessions) the great Wonders which they tell of carrying in the Air, transforming themselves into other Bodies, &c. are still reported to be wrought, not by Incantation or Ceremonies, but by Ointments, and Anointing themselves all over. This may justly move a man to think, that these Fables are the Effects of Imagination: for it is certain that Ointments doe all (if they be laid on any thing thick) by stopping of the Pores, shut in the Vapours, and send them to the Head extremely. And for the particular Ingredients of those Magical Ointments, it is like they are Opiate and Soporiferous. For Anointing of the Fore-head, Neck, Feet, Back-bone, we know is used for procuring Dead Sleeps. And if any man say that this Effect would be better done by Inward Potions; Answer may be made, that the Medicines which go to the Ointments are so strong, that if they were used inwards they would kill those that use them; and therefore they work potently, though outwards.

We will divide the Several Kinds of the Operations by Transmission of Spirits and Imagination, which will give no small Light to the Experiments that follow. All Operations by Transmission of Spirits and Imagination have this, that they work at Distance, and not at Touch; and they are these being distinguished.

The First is, the Transmission or Emission of the Thinner and more Airy parts of Bodies, as in Odours and Infections; and this is, of all the rest, the most Corporeal. But you must remember withal, that there be a number of those Emissions, both Unwholesome and Wholesome, that give no Smell at all; for

For the *Plague* many times when it is taken giveth no *Sent* at all; and there be many good and healthful *Airs*, as they appear by *Habitation* and other proofs, that differ not in *Smell* from other *Airs*. And under this *Head* you may place all *Imbibitions* of *Air*, where the *Substance* is *Material*; *Odour-like*, whereof some nevertheless are strange, and very suddenly diffused; as the alteration which the *Air* receiveth in *Egypt* almost immediately upon the *Rising* of the *River* of *Nile*, whereof we have spoken.

The Second is, the *Transmission* or *Emission* of those things that we call *Spiritual Species*, as *Visibles* and *Sounds*; the one whereof we have handled, and the other we shall handle in due place. These move swiftly and at great distance; but then they require a *Medium* well disposed, and their *Transmission* is easily stopped.

The Third is, the *Emissions* which cause *Attraction* of certain *Bodies* at distance; wherein though the *Load-stone* be commonly placed in the first rank, yet we think good to except it, and refer it to another *Head*: but the *Drawing* of *Amber*, and *Fet*, and other *Electric Bodies*, and the *Attraction* in *Gold* of the *Spirit* of *Quick-silver* at distance; and the *Attraction* of *Heat* at distance, and that of *Fire* to *Naphtha*, and that of some *Herbs* to *Water*, though at distance, and divers others, we shall handle, but yet not under this present *Title*, but under the *Title* of *Attraction* in general.

The Fourth is, the *Emission* of *Spirits*, and *Immaterial Powers* and *Virtues*, in those things which work by the *Universal Configuration* and *Sympathy* of the *World*; not by *Forms*, or *Celestial Influences*, (as is vainly taught and received) but by the *Primitive Nature* of *Matter*, and the *Seeds* of *Things*. Of this kind is (as we yet suppose) the working of the *Load-stone*; which is by consent with the *Globe* of the *Earth*: Of this kind is the *Motion* of *Gravity*, which is by consent of *Dense Bodies* with the *Globe* of the *Earth*: Of this kind is some *Disposition* of *Bodies* to *Rotation*, and particularly from *East* to *West*; of which kind we conceive the *main Float* and *Re-float* of the *Sea* is, which is by *Consent* of the *Universe*, as part of the *Diurnal Motion*. These *Immaterial Virtues* have this *Property* differing from others, that the *Diversity* of the *Medium* hindreth them not, but they pass through all *Mediums*; yet at *Determinate Distances*. And of these we shall speak, as they are incident to several *Titles*.

The Fifth is, the *Emission* of *Spirits*; and this is the Principal in our intention to handle now in this place, namely, the *Operation* of the *Spirits* of the *Mind* of *Man* upon other *Spirits*: and this is of a double *Nature*; the *Operation* of the *Affections*, if they be *Vehement*; and the *Operation* of the *Imagination*, if it be *Strong*. But these two are so coupled, as we shall handle them together: for when an *Envious* or *Amorous Aspect* doth infect the *Spirits* of another, there is joyned both *Affection* and *Imagination*.

The Sixth is, the *Influxes* of the *Heavenly Bodies*, besides those two manifest ones of *Heat* and *Light*. But these we will handle where we handle the *Celestial Bodies* and *Motions*.

The Seventh is, the *Operations* of *Sympathy*, which the *Writers* of *Natural Magick* have brought into an *Art* or *Precept*: and it is this; That if you desire to super-induce any *Virtue* or *Disposition* upon a *Person*, you should take the *Living Creature* in which that *Virtue* is most *Eminent* and in *Perfection*: of that *Creature* you must take the *Parts* wherein that *Virtue* chiefly is *collocate*. Again, you must take the *Parts* in the *Time*, and *At* when that *Virtue* is most in *Exercise*; and then you must apply it to that

part of *Man* wherein that *virtue* chiefly consisteth. As if you would super-induce *Courage* and *Fortitude*, take a *Lion*, or a *Cock*; and take the *Heart*, *Tooth*, or *Paw* of the *Lion*; or the *Heart*, or *Spur* of the *Cock*: take those parts immediately after the *Lion* or the *Cock* have been in *Fight*, and let them be worn upon a *Man's Heart* or *Wrist*. Of these and such like *Sympathies* we shall speak under this present *Title*.

The Eighth and last is, an *Emission* of *Immaterial Virtues*, such as we are a little doubtful to propound it is so prodigious, but that it is so constantly avouched by many: and we have set it down as a *Law* to our selves, to examine things to the bottom; and not to receive upon *Credit*, or reject upon *Improbabilities*, until there hath passed a due *Examination*. This is the *Sympathy* of *Individuals*; for as there is a *Sympathy* of *Species*, so (it may be) there is a *Sympathy* of *Individuals*: that is, that in *Things*, or the *Parts* of *Things* that have been once *Contiguous* or *Entire*, there should remain a *Transmission* of *Virtue* from the one to the other; as between the *Weapon* and the *Wound*. Whereupon is blazed abroad the *Operation* of *Unguentum Teli*; and so of a *piece* of *Lard*, or *stick* of *Elder*, &c. that if part of it be consumed or putrefied, it will work upon the other parts severed. Now we will pursue the *Instances* themselves.

THE *Plague* is many times taken without manifest sense, as hath been said: and they report, that where it is found it hath a sent of the smell of a mellow *Apple*, and (as some say) of *May-flowers*: And it is also received, that smells of *Flowers* that are mellow and luscious are ill for the *Plague*; as *White Lilies*, *Cowslips*, and *Hyacinths*.

The *Plague* is not easily received by such as continually are about them that have the *Plague*, as *Keepers* of the *Sick*, and *Physicians*: nor again by such as take *Antidotes*, either inward (as *Mithridate*, *Juniper-berries*, *Rue*, *Leaf* and *Seed*, &c.) or outward (as *Angelica*, *Zedoary*, and the like, in the *Mouth*; *Tar*, *Galbanum*, and the like, in *Perfume*;) nor again by *Old people*, and such as are of a *drie* and *cold complexion*. On the other side, the *Plague* taketh soonest hold of those that come out of a *fresh Air*, and of those that are *fasting*, and of *Children*; and it is likewise noted to go in a *Bloud* more then to a *stranger*.

The most pernicious *Infection*, next the *Plague*, is the smell of the *Gaol*, when *Prisoners* have been long, and close, and nastily kept; whereof we have had in our time experience twice or thrice, when both the *Judges* that sat upon the *Gaol*, and numbers of those that attended the *Business*, or were present, *sickned* upon it and *died*. Therefore it were good wisdom, that in such cases the *Gaol* were *Aired* before they be brought forth.

Out of question, if such *foul smells* be made by *Art*, and by the *Hand*, they consist chiefly of *Mans flesh*, or *Sweat*, putrefied; for they are not those stinks which the *Nosstrils* straight abhor and expel; that are most pernicious, but such *Airs* as have some similitude with *Mans Body*, and so insinuate themselves, and betray the *Spirits*. There may be great danger in using such *Compositions* in great Meetings of *People* within *Houses*; as in *Churches*, at *Arraignments*, at *Plays* and *Solemnities*, and the like: for poisoning of *Air* is no less dangerous then poisoning of *Water*, which hath been used by the *Turks* in the Wars, and was used by *Emanuel Comnenus* towards the *Christians* when they passed through his *Country* to the *Holy Land*. And these *Empoisonments* of *Air* are the more dangerous in Meetings of *People*, because the much *breath* of *People* doth further the reception of the

911

Experiments in
Consort touch-
ing Emission of
Spirits in Va-
pour or Exha-
lation Odour-
like.

912

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915

the Infection. And therefore when any such thing is feared, it were good those publick places were perfumed before the Assemblies.

916

The Emposonment of particular persons by Odours hath been reported to be in Perfumed Gloves, or the like. And it is like they mingle the Poison that is deadly with some Smells that are sweet, which also maketh it the sooner received. Plagues also have been raised by Anointings of the chinks of Doors, and the like; not so much by the Touch, as for that it is common for men, when they find any thing wet upon their fingers, to put them to their Nose: which men therefore should take heed how they doe. The best is, that these Compositions of Infectious Airs cannot be made without dangers of death to them that make them: but then again, they may have some Antidotes to save themselves; so that men ought not to be secure of it.

917

There have been in divers Countries great Plagues by the putrefaction of great swarms of Grasshoppers and Locusts, when they have been dead and cast upon heaps.

918

It happeneth oft in Mines, that there are Damps which kill either by Suffocation, or by the poisonous Nature of the Mineral: and those that deal much in Refining, or other works about Metalls and Minerals, have their Brains hurt and stupefied by the Metalline Vapours. Amongst which it is noted, that the Spirits of Quick-silver ever stie to the Skull, Teeth, or Bones, insomuch as Gilders use to have a piece of Gold in their mouth to draw the Spirits of Quick-silver, which Gold afterwards they find to be whitened. There are also certain Laker and Pits, such as that of Avernum, that poison Birds (as is said) which stie over them, or Men that stay too long about them.

919

The Vapour of Char-coal or Sea-coal in a close room hath killed many; and it is the more dangerous, because it cometh without any ill Smell, but stealeth on by little and little, induing onely faintness, without any manifest strangling. When the Dutch-men Wintered at Nova Zembla, and that they could gather no more sticks, they fell to make Fire of some Sea-coal they had, wherewith (at first) they were much refreshed; but a little after they had sat about the Fire, there grew a general silence and lothness to speak amongst them; and immediately after one of the weakest of the Company fell down in a Swoon, whereupon they doubting what it was, opened their door to let in Air, and so saved themselves. The effect (no doubt) is wrought by the inspissation of the Air, and so of the Breath and Spirits. The like ensueth in Rooms newly Plastered, if a Fire be made in them; whereof no less Man then the Emperour Fovianus died.

920

Vide the Experiment 803 touching the Infectious Nature of the Air upon the first Showers after long Drought.

921

It hath come to pass that some Apothecaries, upon stamping of Colicquintida, have been put into a great Scouring by the Vapour onely.

922

It hath been a practice to burn a Pepper they call Ginny-pepper, which hath such a strong Spirit, that it provoketh a continual Sneezing in those that are in the Room.

923

It is an ancient Tradition, that Blar Eyes infect Sound Eyes; and that a Menstruous Woman looking in a Glass doth rust it: nay, they have an opinion, which seemeth Fabulous, That Menstruous Women going over a Field of Garden, doe Corn and Herbs good by killing the Worms.

924

The Tradition is no less ancient, that the Basilisk killeth by aspect; and that

that the *Wolf*, if he seeth a *Man* first, by *aspect* striketh a *man* hoarse.

Perfumes convenient do drie and strengthen the *Brain*, and stay *Rheums* and *Defluxions*; as we find in *Fume* of *Rosemary* dried, and *Lignum Aloes*, and *Calamus* taken at the *Mouth* and *Nostrills*. And no doubt there be other *Perfumes* that do moisten and refresh, and are fit to be used in *Burning Agues*, *Consumptions*, and too much *Wakefulness*; such as are *Rose-water*, *Vinegar*, *Limon-pills*, *Piplets*, the *Leaves* of *Vines* sprinkled with a little *Rose-water*, &c.

They do use in *sudden Faintings* and *Swoonings*, to put a *Handkerchief* with *Rose-water*, or a little *Vinegar*, to the *Nose*, which gathereth together again the *Spirits*, which are upon point to resolve and fall away.

Tobacco comforteth the *Spirits*, and dischargeth *Weariness*: which it worketh, partly by opening, but chiefly by the *Opiate virtue*, which condenseth the *Spirits*. It were good therefore to trie the taking of *Fumes* by *Pipes* (as they do in *Tobacco*) of other things, as well to drie and comfort, as for other intentions. I wish trial be made of the *drying Fume* of *Rosemary* and *Lignum Aloes*, before mention'd, in *Pipe*; and so of *Nutmegs*, and *Folium Indum*, &c.

The following of the *Plough* hath been approved for refreshing the *Spirits*, and procuring *Appetite*: but to doe it in the *ploughing* for *Wheat* or *Rie* is not so good, because the *Earth* hath spent her *sweet breath* in *Vegetables* put forth in *Summer*. It is better therefore to doe it when you sow *Barley*. But because *Ploughing* is tied to *Seasons*, it is best to take the *Air* of the *Earth* new turned up by *digging* with the *Spade*, or *standing* by him that diggeth. *Gentlewomen* may doe themselves much good by kneeling upon a *Cushion*, and *Weeding*. And these things you may practise in the best *Seasons*; which is ever the *early Spring*, before the *Earth* putteth forth the *Vegetables*, and in the *sweetest Earth* you can chuse. It would be done also when the *Dew* is a little off the *Ground*, lest the *Vapour* be too moist. I knew a *Great Man* that lived long, who had a clean *clod* of *Earth* brought to him every *morning* as he sate in his *Bed*; and he would hold his *head* over it a good pretty while. I commend also sometimes in *digging* of new *Earth* to pour in some *Malmsey* or *Greek Wine*, that the *Vapour* of the *Earth* and *Wine* together may comfort the *Spirits* the more; provided always it be not taken for a *Heathen Sacrifice* or *Libation* to the *Earth*.

They have in *Physick* use of *Pomanders*, and *knots* of *Powders*, for *drying* of *Rheums*, *comforting* of the *Heart*, *provoking* of *Sleep*, &c. for though those things be not so strong as *Perfumes*, yet you may have them continually in your *hand*; whereas *Perfumes* you can take but at *times*: and besides, there be divers things that breath better of themselves then when they come to the *Fire*; as *Nigella Romana*, the *Seed* of *Melanthium*, *Amomum*, &c.

There be two things which (inwardly used) do cool and condense the *Spirits*; and I wish the same to be tried outwardly in *Vapours*. The one is *Nitre*; which I would have dissolved in *Malmsey*, or *Greek Wine*, and so the *smell* of the *Wine* taken; or, if you would have it more forcible, pour of it upon a *Fire-pan* well heated, as they do *Rose-water* and *Vinegar*. The other is, the *distilled Water* of *Wild Poppey*; which I wish to be mingled at half with *Rose-water*, and so taken with some mixture of a few *Cloves* in a *Perfuming-pan*. The like would be done with the *distilled Water* of *Saffron-Flowers*.

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Smells of Musk, and Amber, and Civit, are thought to further *Venerous Appetite*: which they may doe by the *refreshing* and *calling forth* of the *Spirits*.

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Incense and *Nidorous smells* (such as were of *Sacrifices*) were thought to intoxicate the *Brain*, and to dispose men to *Devotion*: which they may doe by a kind of *Sadneß* and *Contristation* of the *Spirits*; and partly also by *Heating* and *Exalting* them. We see that amongst the *Jews*, the *principal Perfume* of the *Sanctuary* was forbidden all *common uses*.

933

There be some *Perfumes* prescribed by the *Writers of Natural Magick*, which procure *pleasant Dreams*; and some others (as they say) that procure *Prophetical Dreams*, as the *Seeds of Flax*, *Flea-wort*, &c.

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It is certain that *Odours* do, in a small degree, nourish, especially the *Odour of Wine*; and we see men an hungred do love to smell *hot Bread*. It is related that *Democritus*, when he lay a dying, heard a *Woman* in the house complain, that she should be kept from being at a *Feast* and *Solemnity* (which she much desired to see) because there would be a *Corps* in the house: Whereupon he caused *Loaves of new Bread* to be sent for, and open'd them, and poured a little *Wine* into them, and so kept himself alive with the *Odour* of them till the *Feast* was past. I knew a *Gentleman* that would fast (sometimes) three or four, yea, five days, without *Meat*, *Bread*, or *Drink*; but the same man used to have continually a great *Wisp* of *Herbs* that he smelled on, and amongst those *Herbs* some *Esulent Herbs* of strong *Sent*, as *Onions*, *Garlick*, *Leeks*, and the like.

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They do use for the *Accident* of the *Mother* to burn *Feathers*, and other things of ill *Odour*; and by those ill smells the rising of the *Mother* is put down.

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There be *Airs* which the *Physicians* advise their *Patients* to remove unto in *Consumptions*, or upon recovery of long sicknesses, which (commonly) are plain *Champaigns*, but *Grasing*, and not over-grown with *Heath*, or the like; or else *Timber-shades*, as in *Forests*, and the like. It is noted also that *Groves* of *Bays* do forbid *Pestilent Airs*; which was accounted a great cause of the wholesome *Air* of *Antiochia*. There be also some *Soiles* that put forth *Odorate Herbs* of themselves, as *wild Thyme*, *wild Marjoram*, *Penny-royal*, *Camomile*; and in which the *Briar-Roses* smell almost like *Musk-Roses*: which (no doubt) are signs that do discover an excellent *Air*.

937

It were good for men to think of having *healthful Air* in their *Houses*: which will never be if the *Rooms* be low-roofed, or full of *Windows* and *Doors*: for the one maketh the *Air* close, and not fresh; and the other maketh it exceeding *unequal*, which is a great enemy to *health*. The *Windows* also should not be high up to the *Roof* (which is in use for *Beauty* and *Magnificence*) but low. Also *Stone-walls* are not wholesome; but *Timber* is more wholesome, and especially *Brick*: nay, it hath been used by some, with great success, to make their *Walls* thick, and to put a Lay of *Chalk* between the *Bricks*, to take away all dampishness.

Experiment
Solitary touch-
ing the Emissi-
ons of Spiritual
Species, which
affect the
Senses.

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THESE *Emissions* (as we said before) are handled, and ought to be handled, by themselves, under their proper *Titles*; that is, *Visibles*, and *Audibles*, each apart: In this place it shall suffice to give some general *Observations* common to both. First, they seem to be *Incorporeal*. Secondly, they work *Swiftly*. Thirdly, they work at large *Distances*. Fourthly, in *curious Varieties*. Fifthly, they are not *effective* of any thing, nor leave any work

work behind them ; but are *Energies* merely : for their *working* upon *Mirrors* and *places of Echo* doth not alter any thing in those *Bodies* ; but it is the same *Action* with the *Original*, onely *repercussed*. And as for the *Shaking* of *Windows*, or *Rarifying* the *Air* by *great Noises* , and the *Heat* caused by *Burning-glasses*, they are rather *Concomitants* of the *Audible* and *Visible Species* , then the *Effects* of them. Sixthly, they seem to be of so *tender* and *weak a Nature* , as they affect onely such a *Rare* and *Attenuate Substance* as is the *Spirit of Living Creatures*.

IT is mentioned in some *Stories*, that where *Children* have been exposed or taken away young from their *Parents* , and that afterward they have approached to their *Parents* presence, the *Parents* (though they have not known them) have had a *secret Joy*, or other *Alteration*, thereupon.

There was an *Egyptian Sooth-sayer* that made *Antonius* believe, that his *Genius* (which otherwise was *brave* and *confident*) was, in the presence of *Octavianus Caesar*, *poor* and *Cowardly* ; and therefore he advised him to absent himself (as much as he could,) and remove far from him. The *Sooth-sayer* was thought to be suborned by *Cleopatra*, to make him live in *Egypt*, and other *remote places* from *Rome*. Howsoever, the *conceit* of a *Predominant* or *Mastering Spirit* of one *Man* over another is ancient, and received still, even in *Vulgar Opinion*.

There are *Conceits* , that some *Men* that are of an *ill* and *Melancholy Nature* , do incline the *Company* into which they come to be *sad* and *ill disposed* ; and contrariwise, that others that are of a *Jovial nature* do dispose the *Company* to be *merry* and *cheerful* : and again, that some *Men* are *luckie* to be kept *company* with and *employ'd*, and others *unlucky*. Certainly it is agreeable to *Reason*, that there are at the least some *light effluxions* from *Spirit* to *Spirits* when *Men* are in *presence* one with another , as well as from *Body* to *Body*.

It hath been observed, that *Old men* who have loved *Young company* , and been conversant continually with them, have been of *long life* ; their *Spirits* (as it seemeth) being recreated by such *Company*. Such were the *ancient Sophists* and *Rhetoricians* , which ever had *young Auditors* and *Disciples* ; as *Gorgias*, *Protagoras*, *Isocrates*, &c. who lived till they were an hundred years old : and so likewise did many of the *Grammarians* and *School-masters* ; such as was *Orbilus* , &c.

Audacity and *Confidence* doth, in *Civil Business*es, so great *Effects* , as a man may (reasonably) doubt, that besides the very *Daring*, and *Earnestness*, and *Persisting* , and *Importunity* , there should be some *secret binding* and *steeping* of other mens *Spirits* to such *Persons*.

The *Affections* (no doubt) do make the *Spirits* more *powerful* and *active*, and especially those *Affections* which draw the *Spirits* into the *Eyes* ; which are two, *Love*, and *Envy*, which is called *Oculus Malus*. As for *Love*, the *Platonists* (some of them) go so far , as to hold that the *Spirit* of the *Lover* doth pass into the *Spirits* of the person *Loved* , which causeth the desire of return into the *Body* whence it was emitted ; whereupon followeth that *Appetite* of *Contract* and *Conjunction* which is in *Lovers*. And this is observed likewise, that the *Aspects* that procure *Love* are not *Gazings* , but sudden *Glances* and *Dartings* of the *Eye*. As for *Envy*, that emitteth some *Malign* and *Poisonous Spirits* , which take hold of the *Spirit* of another , and is likewise of greatest force when the *Cast* of the *Eye* is *Oblique*. It hath been noted also, that it is most dangerous , where the

Experiments in
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pressions.

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envious Eye is cast upon *Persons* in *Glory*, and *Triumph*, and *Joy*. The reason whereof is, for that at such times the *Spirits* come forth most into the outward parts, and so meet the *percussion* of the *envious Eye* more at hand; and therefore it hath been noted, that after great *Triumphs* men have been ill disposed for some days following. We see the opinion of *Fascination* is Ancient for both *Effects*, of procuring *Love*, and *Sickness* caused by *Envy*; and *Fascination* is ever by the *Eye*. But yet if there be any such *Infection* from *Spirit* to *Spirit*, there is no doubt but that it worketh by *Presence*, and not by the *Eye* alone; yet most forcibly by the *Eye*.

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Fear and *Shame* are likewise *Infective*: for we see that the *starting* of one will make another ready to *start*; and when one man is out of countenance in a company, others do likewise *blush* in his behalf.

Now we will speak of the *Force* of *Imagination* upon other *Bodies*, and of the *Means* to *Exalt* and *Strengthen* it. *Imagination*, in this place, I understand to be the *Representation* of an *Individual Thought*. *Imagination* is of three kinds. The First joyned with *Belief* of that which is to come: The Second joyned with *Memory* of that which is past: And the Third is of things present, or as if they were present; for I comprehend in this, *Imagination Feigned*, and at *Pleasure*: as if one should imagine such a man to be in the *Vestments* of a *Pope*, or to have *Wings*. I single out for this time that which is with *Faith*, or *Belief* of that which is to come. The *Inquisition* of this *Subject* in our way (which is by *Induction*) is wonderful hard, for the things that are reported are full of *Fables*; and new *Experiments* can hardly be made but with extreme caution, for the Reason which we will after declare.

The *Power* of *Imagination* is in three kinds. The First, upon the *Body* of the *Imaginant*, including likewise the *Child* in the *Mother's Womb*: The Second is, the *Power* of it upon *Dead Bodies*, as *Plants*, *Wood*, *Stone*, *Metall*, &c. The Third is, the *Power* of it upon the *Spirits* of *Men* and *Living Creatures*: And with this last we will onely meddle.

The *Probleme* therefore is, Whether a *Man* constantly and strongly believing that such a thing shall be, (as that such an one will love him, or that such an one will grant him his request, or that such an one shall recover a *Sickness*, or the like) it doth help any thing to the effecting of the thing it self. And here again we must warily distinguish: For it is not meant (as hath been partly said before) that it should help by making a man more stout, or more industrious; (in which kind constant *Belief* doth much) but merely by a secret Operation,

ration, of Binding, or Changing the Spirit of another. And in this it is hard (as we began to say) to make any *New Experiment*; for I cannot command my self to Believe what I will, and so no Trial can be made. Nay it is worse; for whatsoever a Man imagineth doubtingly or with Fear, must needs doe hurt, if Imagination have any Power at all; for a man representeth that oftner that he feareth, then the contrary.

The help therefore is, for a man to work by Another, in whom he may create Belief, and not by Himself, until Himself have found by Experience that Imagination doth prevail: for then Experience worketh in Himself Belief, if the Belief that such a Thing shall be be joyned with a Belief that his Imagination may procure it.

For example, I related one time to a man that was curious and vain enough in these things, *That I saw a kind of Jugler that had a Pair of Cards, and would tell a man what Card he thought.* This pretended learned man told me, it was a mistaking in me; For (said he) *it was not the Knowledge of the mans thought (for that is proper to God) but it was the Inforcing of a Thought upon him, and Binding his Imagination by a stronger, that he could Think no other Card.* And thereupon he asked me a Question or two, which I thought he did but cunningly, knowing before what used to be the Feats of the Jugler. Sir, (said he) *do you remember whether he told the Card the man thought Himself, or bade Another to tell it?* I answered, (as was true) *That he bade Another tell it.* Whereunto he said, *So I thought: For (said he) Himself could not have put on so strong an Imagination; but by telling the other the Card (who believed that the Jugler was some strange man, and could doe strange Things) that other man caught a strong Imagination.* I hearkened unto him, thinking for a Vanity he spake prettily. Then he asked me another Question: Saith he, *Do you remember whether he bade the man think the Card first, and afterwards told the other man in his Ear what he should think; or else that he did whisper first in the mans Ear that should tell the Card, telling that such a man should think such a Card, and after bade the man think a Card?* I told him, (as was true) *That he did first whisper the man in the Ear, that such a man should think such a Card.* Upon this the Learned man did much exult and please himself, saying, *Lo, you may see that my Opinion is right: for if the man had thought first, his Thought had been fixed; but the other Imagining first, bound his Thought.* Which though it did somewhat sink with me, yet I made it lighter then I thought, and said, *I thought it was Confederacy between the Jugler and the two Servants: though (indeed) I had no reason so to think, for they were both my Father's servants, and he had never plaid in the House before.* The Jugler also did cause a Garter to be held up, and took upon him to know that such an one should point in such a Place of the Garter, as it should be near so many Inches to the Longer end, and so many to the Shorter; and still he did it by first telling the Imaginer, and after bidding the *Assour Think.*

Having told this Relation, not for the Weight thereof, but because it doth handsomly open the Nature of the Question; I return to

that I said, That *Experiments* of *Imagination* must be practised by others, and not by a *mans* self. For there be Three means to fortifie *Belief*: The First is *Experience*, the Second is *Reason*, and the Third is *Authority*. And that of these which is farre the most Potent, is *Authority*: For *Belief* upon *Reason* or *Experience* will stagger.

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For *Authority*, it is of two kinds; *Belief* in an *Art*, and *Belief* in a *Man*. And for things of *Belief* in an *Art*, a *man* may exercise them by *Himself*; but for *Belief* in a *Man*, it must be by *Another*. Therefore if a *man* believe in *Astrology*, and find a *Figure* prosperous; or believe in *Natural Magick*, and that a *Ring* with such a *Stone*, or such a *Piece* of a *Living Creature* carried, will doe good, it may help his *Imagination*. But the *Belief* in a *Man* is far the more *Active*. But howsoever all *Authority* must be out of a *mans* Self, turned (as was said) either upon an *Art* or upon a *Man*: and where *Authority* is from one *man* to another, there the second must be *Ignorant*, and not *Learned*, or full of *Thoughts*: And such are (for the most part) all *Witches* and *Superstitious persons*; whose *beliefs*, tied to their *Teachers* and *Traditions*, are no whit controlled either by *Reason* or *Experience*: And upon the same *Reason*, in *Magick* they use (for the most part) *Boys* and young *People*, whose *Spirits* easiliest take *Belief* and *Imagination*.

Now to fortifie *Imagination* there be three ways: the *Authority* whence the *Belief* is derived; *Means* to quicken and corroborate the *Imagination*; and *Means* to repeat it and refresh it.

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For the *Authority* we have already spoken. As for the Second, namely, the *Means* to quicken and corroborate the *Imagination*, we see what hath been used in *Magick*; (if there be in those practices any thing that is purely *Natural*;) as *Vestments*, *Characters*, *Words*, *Seals*, some parts of *Plants*, or *Living creatures*, *Stones*, *Choice of the Hour*, *Gestures* and *Motions*; also *Incenses* and *Odours*, *Choice of Society*, which increaseth *Imagination*, *Diets* and *Preparations* for some time before. And for *Words*, there have been ever used, either *Barbarous words* of no sense, lest they should disturb the *Imagination*; or words of *Similitude*, that may second and feed the *Imagination*: And this was ever as well in *Heathen Charms*, as in *Charms* of later Times. There are used also *Scripture-words*; for that the *Belief* that *Religious Texts* and *Words* have power, may strengthen the *Imagination*. And for the same reason *Hebrew words* (which amongst us is counted the *Holy Tongue*, and the words more *mystical*) are often used.

949

For the *refreshing* of the *Imagination* (which was the Third *Means* of *Exalting* it) we see the practices of *Magick*: as in *Images* of *Wax*, and the like, that should melt by little and little; or some other *things* buried in *Muck*, that should putrefie by little and little, or the like: For so oft as the *Imaginant* doth think of those things, so oft doth he represent to his *Imagination* the effect of that he desireth.

950

If there be any power in *Imagination*, it is less credible that it should be so *Incorporeal* and *Immaterial* a *Virtue* as to work at great *Distances*, or through all *Mediums*, or upon all *Bodies*: but that the *Distance* must be competent, the *Medium* not adverse, and the *Body* apt and proportionate. Therefore if there be any operation upon *Bodies* in absence by Nature,

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it is like to be conveyed from *Man to Man* as *Fame* is: As if a *Witch* by *Imagination* should hurt any afar off, it cannot be naturally, but by working upon the *Spirit* of some, that cometh to the *Witch*, and from that party upon the *Imagination* of another, and so upon another, till it come to one that hath resort to the *Party intended*; and so by *Him* to the *Party intended himself*. And although they speak that it sufficeth to take a *Point*, or a piece of the *Garment*, or the *Name* of the party, or the like; yet there is less credit to be given to those things, except it be by *working* of *evil Spirits*.

The *Experiments* which may certainly demonstrate the *Power* of *Imagination* upon other *Bodies* are few or none; for the *Experiments* of *Witchcraft* are no clear *Proofs*, for that they may be by a *Tacit Operation* of *Malign Spirits*: We shall therefore be forced in this *Enquiry* to resort to new *Experiments*; wherein we can give onely *Directions* of *Trials*, and not any *Positive Experiments*. And if any man think that we ought to have stayed till we had made *Experiment* of some of them our selves, (as we doe commonly in other *Titles*) the truth is, that these *Effects* of *Imagination* upon other *Bodies* have so little *Credit* with us, as we shall try them at leisure: But in the mean time we will lead others the way.

When you work by the *Imagination* of another, it is necessary that he by whom you work have a *precedent Opinion* of you that you can doe strange things, or that you are a *Man of Art*, as they call it; for else the simple *Affirmation* to another, that this or that shall be, can work but a weak *Impression* in his *Imagination*.

It were good, because you cannot discern fully of the *Strength* of *Imagination* in one man more then another, that you did use the *Imagination* of more then one; that so you may light upon a *Strong one*. As if a *Physician* should tell three or four of his *Patients servants* that their *Master* shall surely recover.

The *Imagination* of one that you shall use (such is the variety of *mens minds*) cannot be alwaies alike *constant* and *strong*; and if the success follow not speedily, it will faint and lose *Strength*. To remedy this, you must pretend to him whose *Imagination* you use several degrees of *Means* by which to *Operate*: As to prescribe him, that every three days, if he find not the success apparent, he do use another *Root*, or part of a *Beast*, or *Ring*, &c. as being of more *Force*; and if that fail, another; and if that, another, till seven times. Also you must prescribe a good large *Time* for the *Effect* you promise; as if you should tell a *servant* of a *sick man* that his *Master* shall recover, but it will be fourteen days ere he findeth it apparently, &c. All this to entertain the *Imagination*, that it waver less.

It is certain that *Poisons*, or *Things* taken into the *Body*, *Incense* and *Perfumes* taken at the *Nostrils*, and *Ointments* of some *Parts*, do (naturally) work upon the *Imagination* of him that taketh them. And therefore it must needs greatly *cooperate* with the *Imagination* of him whom you use, if you prescribe him, before he do use the *Recet* for the *Work* which he desireth, that he do take such a *Pill*, or a *Spoonfull* of *Liquor*, or burn such an *Incense*, or anoint his *Temples*, or the *Soles* of his *Feet*, with such an *Ointment*,

ment or Oil: And you must chuse for the *Composition* of such *Pill*, *Perfume*, or *Ointment*, such *Ingredients* as do make the *Spirits* a little more *gross*, or *muddy*, whereby the *Imagination* will fix the better.

955 The *Body Passive*, and to be *Wrought upon*, (I mean not of the *Imaginant*) is better wrought upon (as hath been partly touched) at some *Times* then at others: As if you should prescribe a *Servant* about a *sick Person*, (whom you have possessed that his *Master* shall recover) when his *Master* is fast asleep, to use such a *Root* or such a *Root*. For *Imagination* is like to work better upon *sleeping men* then *men awake*; as we shall shew when we handle *Dreams*.

956 We find in the *Art of Memory*, that *Images visible* work better then other *Concepts*: As if you would remember the word *Philosophy*, you shall more surely doe it by *imagining* that such a *man* (for *Men* are best *Places*) is reading upon *Aristotle's Physicks*, then if you should imagine him to say, *I'll go study Philosophy*. And therefore this *Observation* would be translated to the *subject* we now speak of; for the more lustrous the *Imagination* is, it filleth and fixeth the better. And therefore I conceive that you shall in that *Experiment* (whereof we spake before) of *binding of Thoughts*, less fail, if you tell one that such an one shall name one of *twenty Men*, then if it were one of *twenty Cards*. The *Experiment of binding of Thoughts* would be diversified and tried to the full: And you are to note whether it hit for the most part, though not alwaies.

957 It is good to consider upon what *Things Imagination* hath most force: And the *Rule* (as I conceive) is, that It hath most *Force* upon *Things* that have the *lightest* and *easiest Motions*; and therefore above all upon the *Spirits of Men*, and in them upon such *Affections* as move *lightest*; as upon *procuring of Love*, *binding of Lust*, which is ever with *Imagination*, upon *Men in Fear*, or *Men in Irresolution*, and the like. Whatsoever is of this kind would be throughly enquired. *Trials* likewise would be made upon *Plants*, and that diligently: As if you should tell a *man* that such a *Tree* would die this year, and will him at these and these times to go unto it, to see how it thriveth. As for *Inanimate things*, it is true that the *motions of Shuffling of Cards*, or *Casting of Dice*, are very *light Motions*: And there is a *Folly* very useful, that *Gamesters* imagine that some that stand by them bring them ill luck. There would be *Trial* also made of holding a *Ring* by a *Thred* in a *Glass*, and telling him that holdeth it before, that it shall strike so many times against the *side of the Glass*, and no more: Or of holding a *Key* between two *mens fingers* without a *Charms*, and to tell those that hold it, that at such a *Name* it shall go off their *Fingers*. For these two are extreme *light Motions*. And howsoever I have no opinion of these things, yet so much I conceive to be true, That *strong Imagination* hath more force upon *Things living* or that have been *living* then *Things merely Inanimate* and more force likewise upon *light and subtil Motions*, then upon *Motions vehement or ponderous*.

958 It is an usual *Observation*, that if the *Body* of one *murderer* can be brought before the *Murderer*, the *Wounds* will bleed afresh. Some do affirm, that the *dead Body*, upon the presence of the *Murderer*, hath opened the *Eyes*, and that there have been such like *Motions* as well where the *Party murdered* hath been *Strangled* or *Drowned*, as where they have been *Killed* by *Wounds*. It may be that this participateth of a *Miracle*, by Gods just Judgement, who usually bringeth *Murders* to light: But if it be *Natural*, it must be referred to *Imagination*.

The *Tying* of the *Point* upon the day of *Marriage*, to make men impotent towards their *Wives*, which (as we have formerly touched) is so frequent in *Zant* and *Gascony*, if it be *Natural*, must be referred to the *Imagination* of *Him* that *tieth* the *Point*. I conceive it to have the less affinity with *Witchcraft*, because not peculiar persons only, (such as *Witches* are) but any *body* may do it.

959

There be many *Things* that work upon the *Spirits* of *Man* by *secret Sympathy* and *Antipathy*. The *Virtues* of *Precious Stones* worn have been anciently and generally received, and curiously assigned to work several *Effects*. So much is true, that *Stones* have in them fine *Spirits*, as appeareth by their *Splendour*: And therefore they may work by *consent* upon the *Spirits* of *Men*, to comfort and exhilarate them. Those that are the best for that *Effect*, are the *Diamond*, the *Emerald*, the *Jacynth Oriental*, and the *Gold-Stone*, which is the *yellow Topaz*. As for their particular *Proprieties*, there is no credit to be given to them. But it is manifest that *Light* above all things excelleth in *comforting* the *Spirits* of *Men*: And it is very probable that *Light* varied doth the same *Effect* with more *Novelty*. And this is one of the *Causes* why *Precious Stones* comfort. And therefore it were good to have *Tinted Lantorns*, or *Tinted Skreens* of *Glass* coloured into *Green*, *Blue*, *Carnation*, *Crimson*, *Purple*, &c. and to use them with *Candles* in the *Night*. So likewise to have round *Glasses*, not only of *Glass* coloured through, but with *Colours* laid between *Crystals*, with *Handles* to hold in ones hand. *Prisms* are also comfortable things. They have of *Paris-work*, *Looking-Glasses* bordered with broad *Borders* of small *Crystal*, and great counterfeit *Precious Stones* of all *Colours*, that are most glorious and pleasant to behold, especially in the *Night*. The *Pictures* of *Indian Feathers* are likewise comfortable and pleasant to behold. So also fair and clear *Pools* do greatly comfort the *Eies* and *Spirits*, especially when the *Sun* is not *Glaring* but *Overcast*, or when the *Moon* shineth.

Experiments
in Confort
touching the
Secret Virtue
of Sympathy
and Antipathy.

960

There be divers sorts of *Bracelets* fit to *Comfort* the *Spirits*; and they be of three *Intentions*; *Refrigerant*, *Corroborant*, and *Aperient*. For *Refrigerant* I wish them to be of *Pearl*, or of *Coral*, as is used. And it hath been noted that *Coral*, if the *Party* that weareth it be ill disposed, will wax *pale*; which I believe to be true, because otherwise distemper of *Heat* will make *Coral* lose colour. I commend also *Beads* or little *Plates* of *Lapis Lazuli*, and *Beads* of *Nitre*, either alone, or with some *Cordial mixture*.

961

For *Corroboration* and *Comfortation*, take such *Bodies* as are of *Astringent* quality without manifest *cold*. I commend *Bead-Amber*, which is full of *Astriction*, but yet is *Unctuous*, and not *Cold*, and is conceived to *Impinguate* those that wear such *Beads*. I commend also *Beads* of *Hart-Horn* and *Ivory*, which are of the like nature; also *Orange-Beads*; also *Beads* of *Lignum Aloes*, macerated first in *Rose-water* and dried.

962

For *Opening*, I commend *Beads*, or pieces of the *Roots* of *Cardus Benedictus*; also of the *Roots* of *Peony*, the *Male*, and of *Orris*; and of *Calamus Aromaticus*, and of *Rain*.

963

The *Cramp* (no doubt) cometh of *Contraction* of *Sinews*; which is manifest in that it cometh either by *Cold* or *Driness*; as after *Consumptions* and *Long Agues*; For *Cold* and *Driness* do (both of them) *Contract* and *Corrupture*. We see also that *Chasing* a little above the place in pain easeth the *Cramp*; which is wrought by the *Dilatation* of the *Contracted Sinews* by *Heat*. There are in use for the prevention of the *Cramp* two things:

964

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The one *Rings* of *Sea-Horse Teeth* worn upon the *Fingers*; the other *bands* of *Green Perwinckle* (the *Herb*) tied about the *Calf* of the *Leg*, or the *Thigh*, &c. where the *Cramp* useth to come. I do find this the more strange, because neither of these have any *Relaxing Virtue*, but rather the contrary. I judge therefore that their *Working* is rather upon the *Spirits* within the *Nerves* to make them strive less, then upon the *Bodily Substance* of the *Nerves*.

965 I would have *Triall* made of two other *kinds* of *Bracelets* for *comforting* the *Heart* and *Spirits*. The one of the *Trochisch* of *Vipers* made into little *pieces* of *Beads*; for since they doe great good inwards, (especially for *Pestilent Agues*) it is like they will be effectual outwards, where they may be applied in greater *quantity*. There would be *Trochischs* likewise made of *Snakes*, whose *Flesh* dried is thought to have a very *Opening* and *Cordial Virtue*. The other is of *Beads* made of the *Scarlet Powder*, which they call *Kermes*, which is the principal *Ingredient* in their *Cordial-Confection Alkermes*: The *Beads* would be made up with *Amber-Greece*, and some *Pomander*.

966 It hath been long received, and confirmed by divers *Trialls*, that the root of the *Male-Perony* dried, tied to the *Neck*, doth help the *Falling-Sick-ness*; and likewise the *Incubus*, which we call the *Mare*. The *Cause* of both these *Diseases*, and especially of the *Epilepsie* from the *Stomack*, is the *Gross-ness* of the *Vapours* which rise and enter into the *Cells* of the *Brain*: And therefore the *Working* is by *Extreme* and *Subtil Attenuation*, which that *Simple* hath. I judge the like to be in *Castoreum*, *Musk*, *Ren-Seed*, *Agnus Castus Seed*, &c.

967 There is a *Stone* which they call the *Bloud-stone*, which worn is thought to be good for them that bleed at the *Nose*; which (no doubt) is by *Astriction* and *cooling* of the *Spirits*. *Quare*, if the *Stone* taken out of the *Toad's Head* be not of the like virtue, for the *Toad* loveth *Shade* and *Coolness*.

968 Light may be taken from the *Experiment* of the *Horse-Tooth Ring* and the *Garland* of *Perwinckle*, how that those things which assuage the *Strife* of the *Spirits*, do help diseases, contrary to the *Intention* desired: for in the *curing* of the *Cramp*, the *Intention* is to relax the *Sinews*; but the *contraction* of the *Spirits*, that they strive less, is the best help: So to procure easie *Tra-vails* of *Women*, the *Intention* is to bring down the *Child*; but the help is, to stay the *Coming down* too fast: whereunto they say the *Toad-stone* likewise helpeth. So in *Pestilent Fevers*, the *Intention* is to expel the *Infection* by *Sweat* and *Evaporation*; but the best *Means* to doe it is by *Nitre*, *Dia-cordium*, and other *Cool things*, which do for a time arrest the *Expulsion*, till *Nature* can doe it more quietly. For as one saith prettily, *In the quenching of the Flame of a Pestilent Ague*, *Nature* is like *People* that come to quench the *Fire of an House*, which are so busie as one of them letteth another. Surely it is an excellent *Axiome*, and of manifold *Use*, that whatsoever appeareth the *contention* of *Spirits* furthereth their *Action*.

969 The *Writers* of *Natural Magick* commend the wearing of the *Spoil* of a *Snake* for *preserving* of *Health*. I doubt it is but a *conceit*; for that the *Snake* is thought to renew her *Youth* by casting her *Spoil*. They might as well take the *Beak* of an *Eagle*, or a piece of a *Harts-horn*, because those renew.

970 It hath been anciently received (for *Pericles* the *Athenian* used it) and it is yet in use, to wear little *Bladders* of *Quick-silver*, or *Tablets* of *Arsenick*, as *Preservatives* against the *Plague*: Nor, as they conceive, for any *comfort* they yield to the *Spirits*, but for that being *Poisons* themselves, they draw the *Venome* to them from the *Spirits*.

Vide the Experiments 95, 96, and 97. touching the several Sympathies and Antipathies. for Medicinal use.

It is said that the *Guts* or *Skin* of a *Wolf* being applied to the *Belly* do cure the *Colick*. It is true; that the *Wolf* is a *Beast* of great *Edacity* and *Digestion*; and so it may be the *Parts* of him comfort the *Bowels*.

We see *Scare-Crows* are set up to keep *Birds* from *Corn* and *Fruit*. It is reported by some, that the *Head* of a *Wolf*, whole, dried and hanged up in a *Dove-house*, will scare away *Vermin*, such as are *Weasils*, *Polecats*, and the like. It may be the *Head* of a *Dog* will doe as much; for those *Vermin* with us know *Dogs* better then *Wolves*.

The *Brains* of some *Creatures*, (when their *Heads* are roasted) taken in *Wine* are said to strengthen the *Memory*: as the *Brains* of *Hares*, *Brains* of *Hens*, *Brains* of *Deer*, &c. And it seemeth to be incident to the *Brains* of those *Creatures* that are fearful.

The *Ointment* that *Witches* use is reported to be made of the *Fat* of *Children* digged out of their *Graves*; of the *Juices* of *Smallage*, *Woolf-bane*, and *Cinquefoil*, mingled with the *Meal* of fine *Wheat*. But I suppose that the *Soporiferous Medicines* are likest to doe it; which are *Henbane*, *Hemlock*, *Mandrake*, *Moon-shade*, *Tobacco*, *Opium*, *Saffron*, *Poplar-leaves*, &c.

It is reported by some, that the *Affections* of *Beasts* when they are in strength do adde some *Virtue* unto *Inanimate things*: As that the *Skin* of a *Sheep* devoured by a *Wolf* moveth *Itching*; That a *stone* bitten by a *Dog* in anger, being thrown at him, drunk in *Powder* provoketh *Choler*.

It hath been observed, that the *Diet* of *Women* with *Child* doth work much upon the *Infant*. As if the *Mother* eat *Quinces* much and *Coriander-seed*, (the *Nature* of both which is to repress and stay *Vapours* that ascend to the *Brain*;) it will make the *Child* ingenious: And on the contrary side, if the *Mother* eat (much) *Onions* or *Beans*, or such *Vaporous food*, or drink *Wine* or *Strong drink* immoderately, or *Fast* much, or be given to much *Musing*, (all which send or draw *Vapours* to the *Head*) it indangereth the *Child* to become *Lunatick*, or of imperfect *Memory*: And I make the same Judgement of *Tobacco* often taken by the *Mother*.

The *Writers* of *Natural Magick* report, that the *Heart* of an *Ape* worn near the *Heart* comforteth the *Heart*, and increaseth *Audacity*. It is true that the *Ape* is a merry and bold *Beast*. And that the same *Heart* likewise of an *Ape* applied to the *Neck* or *Head* helpeth the *Wit*, and is good for the *Falling Sicknes*. The *Ape* also is a witty *Beast*, and hath a *dry Brain*, which may be some *Cause* of *Attenuation* of *Vapours* in the *Head*. Yet it is said to move *Dreams* also. It may be the *Heart* of a *Man* would doe more, but that it is more against *mens* minds to use it, except it be in such as wear the *Reliques* of *Saints*.

The *Flesh* of a *Hedge-Hog* dressed and eaten is said to be a great *Drier*. It is true that the *Juice* of a *Hedge-Hog* must needs be *Harsh* and *Dry*, because it putteth forth so many *Prickles*: For *Plants* also that are full of *Prickles* are generally *Dry*; as *Briars*, *Thorns*, *Barberries*. And therefore the *Ashes* of a *Hedge-Hog* are said to be a great *Desiccative* of *Fistula's*.

Mummy hath great force in *Stanching* of *Bloud*; which as it may be ascribed to the *Mixture* of *Balms* that are *Glutenous*, so it may also partake of a secret *Propriety*, in that the *Bloud* draweth *Mans-flesh*. And it is approved, that the *Moss* which groweth upon the *Scull* of a *dead Man* unburied will stanch *Bloud* potently. And so do the *Dregs* or *Powder* of *Bloud*, severed from the *Water* and dried.

981 It hath been practised to make *White Swallows*, by *Anointing* of the eggs with *Oil*. Which effect may be produced by the *Stopping* of the *Pores* of the *Shell*, and making the *Juice* that putteth forth the *Feathers* afterwards more penurious. And it may be, the *Anointing* of the *Eggs* will be as effectual as the *Anointing* of the *Body*: Of which *Vide* the *Experiment* 93.

982 It is reported that the *White* of an *EGGE* or *Blond* mingled with *Salt-water*, doth gather the *Saltneß*, and maketh the *Water* sweeter. This may be by *Adhesion*; as in the 6. *Experiment* of *Clarification*. It may be also that *Blond* and the *White* of an *EGGE* (which is the *Matter* of a *Living Creature*) have some *Sympathy* with *Salt*: for all *Life* hath a *Sympathy* with *Salt*. We see that *Salt* laid to a *Cut finger* healeth it; so as it seemeth *Salt* draweth *Blond*, as well as *Blond* draweth *Salt*.

983 It hath been anciently received, that the *Sea-Hare* hath an *Antipathy* with the *Lungs*, (if it cometh near the *Body*) and erodeth them. Whereof the *Cause* is conceived to be a *Quality* it hath of *Heating* the *Breath* and *Spirits*, as *Cantharides* have upon the *Watry parts* of the *Body*, as *Urine* and *Hydropical Water*. And it is a good *Rule*, that whatsoever hath an *Operation* upon certain *kinds* of *Matters*, that in *Mans Body* worketh most upon those *Parts* wherein that kind of *Matter* aboundeth.

984 Generally that which is *Dead*, or *Corrupted*, or *Excerned*, hath *Antipathy* with the same *Thing* when it is *Alive*, and when it is *Sound*, and with those *Parts* which do *Excern*: As a *Carcass* of *Man* is most *Infectious* and *Odious* to *Man*, a *Carrion* of an *Horse* to an *Horse*, &c. *Purulent Matter* of *Wounds* and *Ulcers*, *Carbuncles*, *Pox*, *Scabs*, *Leprosie*, to *Sound Flesh*; and the *Excrements* of every *Species* to that *Creature* that *Excerneth* them. But the *Excrements* are less pernicious then the *Corruptions*.

985 It is a common *Experience* that *Dogs* know the *Dog-Killer*, whenas in times of *Infection* some pety *Fellow* is sent out to kill the *Dogs*; and that though they have never seen him before, yet they will all come forth, and bark, and flie at him.

986 The *Relations* touching the *Force* of *Imagination* and the *Secret Instincts* of *Nature* are so uncertain, as they require a great deal of *Examination* ere we conclude upon them. I would have it first thoroughly inquired, whether there be any secret *Passages* of *Sympathy* between *Persons* of near *Blond*; as *Parents*, *Children*, *Brothers*, *Sisters*, *Nurse-Children*, *Husbands*, *Wives*, &c. There be many reports in *History*, that upon the *Death* of *Persons* of such *Nearness*, *Men* have had an inward *Feeling* of it. I my self remember, that being in *Paris*, and my *Father* dying in *London*, two or three daies before my *Father's* death I had a *Dream*, which I told to divers *English Gentlemen*, that my *Father's House* in the *Country* was *Plaistered* all over with *Black Mortar*. There is an opinion abroad, (whether idle or no I cannot say) That loving and kind *Husbands* have a *Sense* of their *Wives* breeding *Child* by some *Accident* in their own *Body*.

987 Next to those that are near in *Blond*, there may be the like *Passage* and *Instincts* of *Nature* between great *Friends* and *Enemies*. And sometimes the revealing is unto another *Person*, and not to the *Party* himself. I remember *Philippus Comineus* (a grave *Writer*) reporteth, That the *Arch-Bishop* of *Vienna* (a *Reverend Prelat*) said (one day) after *Mass* to *King Lewis* the eleventh of *France*, Sir, your *Mortal Enemy* is dead; what time *Charls Duke* of *Burgundy* was slain at the *Battel* of *Granson* against the *Switzers*. Some trial also would be made whether *Paff* or *Agreement* doe any thing: As if two *Friends* should agree, that such a *Day* in every *Week*, they
being

being in far *distant places* should pray one for another, or should put on a *Ring* or *Tablet* one for another's sake; whether if one of them should break their *Vow* and *Promise*, the other should have any feeling of it in *Absence*.

988

If there be any *force* in *Imaginations* and *Affections* of *singular Persons*, it is probable the *force* is much more in the *joynt Imaginations* and *Affections* of *Multitudes*: As if a *Victory* should be won or lost in *remote parts*; whether is there not some *sense* thereof in the *people* whom it concerneth, because of the great *Foy* or *Grief* that many men are possess'd with at once? *Pius Quintus*, at the very time when that memorable *Victory* was won by the *Christians* against the *Turks* at the *Naval Battel* of *Lepanto*, being then hearing of *Causes* in the *Consistory*, brake off suddenly, and said to those about him, *It is now more then time we should give thanks to God for the great Victory he hath granted us against the Turks*. It is true, that *Victory* had a *Sympathy* with his *Spirit*, for it was merely his work to conclude that *League*: It may be that *Revelation* was *Divine*. But what shall we say then to a number of *Examples* amongst the *Grecians* and *Romans*, where the *People* being in *Theatres* at *Plays*, have had news of *Victories* and *Overthrows* some few days before any *Messenger* could come?

It is true, that that may hold in these things which is the general *Root* of *Superstition*; namely, that men observe when things *Hit*, and not when they *Miss*, and commit to *Memory* the one, and forget and pass over the other. But touching *Divination* and the *Misgiving* of *Minds*, we shall speak more when we handle in general the *Nature* of *Minds*, and *Souls*, and *Spirits*.

989

We having given formerly some *Rules* of *Imagination*, and touching the *fortifying* of the same; we have set down also some few *Instances* and *Directions* of the *force* of *Imagination* upon *Beasts*, *Birds*, &c. upon *Plants*, and upon *Inanimate Bodies*: Wherein you must still observe, that your *Trials* be upon *Subtil* and *Light Motions*, and not the contrary: for you will sooner by *Imagination* bind a *Bird* from *Singing* then from *Eating* or *Flying*; and I leave it to every man to chuse *Experiments* which himself thinketh most commodious, giving now but a few *Examples* of every of the three kinds.

990

Use some *Imaginant* (observing the *Rules* formerly prescribed) for *Binding* of a *Bird* from *Singing*; and the like of a *Dog* from *Barking*. Try also the *Imagination* of some, whom you shall accommodate with things to fortify it, in *Cock-fights*, to make one *Cock* more hardy, and the other more cowardly. It would be tried also in *Flying* of *Hawks*, or in *Coursing* of a *Deer* or *Hart* with *Grey-hounds*, or in *Horse-races*, and the like *comparative Motions*: for you may sooner by *Imagination* quicken or slack a *Motion*, then raise or cease it; as it is easier to make a *Dog* go slower, then to make him stand still that he may not run.

991

In *Plants* also you may trie the *force* of *Imagination* upon the *lighter* sort of *Motions*; as upon the sudden *fading* or lively *coming up* of *Herbs*, or upon their *bending* one way or other, or upon their *closeing* and *opening*, &c.

992

For *Inanimate things*, you may trie the *force* of *Imagination* upon stay-
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ing the *working* of *Beer*, when the *Barm* is put in; or upon the *coming* of *Butter* or *Cheese*, after the *Churning*, or the *Rennet* be put in.

993

It is an ancient *Tradition*, every where alleged, for *Example* of *secret Proprieties* and *Influxes*, that the *Torpedo Marina*, if it be touched with a long stick, doth stupefie the *Hand* of him that toucheth it. It is one degree of *working* at *distance*, to work by the continuance of a fit *Medium*; as *Sound* will be conveyed to the *Ear* by striking upon a *Bow-string*, if the *Horn* of the *Bow* be held to the *Ear*.

994

The *Writers* of *Natural Magick* do attribute much to the *Virtues* that come from the *parts* of *living Creatures*, so as they be taken from them, the *Creatures* remaining still alive; as if the *Creature* still living did infuse some *Immaterial Virtue* and *Vigour* into the *part severed*. So much may be true, that any *part* taken from a *living Creature* newly slain, may be of greater force than if it were taken from the like *Creature* dying of it self; because it is fuller of *Spirit*.

995

Trial would be made of the like *parts* of *Individuals* in *Plants* and *living Creatures*: as to cut off a *Stock* of a *Tree*, and to lay that which you cut off to *putresce*, to see whether it will decay the rest of the *Stock*; or if you should cut off part of the *Tail* or *Leg* of a *Dog* or a *Cat*, and lay it to *putresce*, to see whether it will *fester*, or keep from *healing*, the *part* which remaineth.

996

It is received, that it helpeth to *continue Love* if one wear a *Ring* or a *Bracelet* of the *Hair* of the party beloved. But that may be by the *exciting* of the *Imagination*: and perhaps a *Glove* or other like *Favour* may as well do it.

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The *Sympathy* of *Individuals* that have been *Entire*, or have *Touched*, is of all others the most *incredible*: yet according unto our faithful manner of *Examination* of *Nature*, we will make some little mention of it. The *taking away* of *Warts*, by *rubbing* them with somewhat that afterwards is put to waste and consume, is a common *Experiment*; and I do apprehend it the rather because of mine own *Experience*. I had from my *Childhood* a *Wart* upon one of my *fingers*: afterwards, when I was about sixteen years old, being then at *Paris*, there grew upon both my hands a number of *Warts* (at least an hundred) in a months space. The *English Ambassadors Lady*, who was a *Woman* far from *Superstition*, told me one day she would help me away with my *Warts*. Whereupon she got a piece of *Lard* with the *skin* on, and rubbed the *Warts* all over with the *fat side*, and amongst the rest that *Wart* which I had from my *Childhood*: then she nailed the *piece* of *Lard*, with the *fat* towards the *Sun*, upon a *Post* of her *Chamber-window*, which was to the *South*. The success was, that within five weeks space all the *Warts* went quite away, and that *Wart* which I had so long endured, for company. But at the rest I did little marvel, because they came in a short time, and might go away in a short time again; but the going of that which had staid so long doth yet stick with me. They say the like is done by rubbing of *Warts* with a green *Elder-stick*, and then *burying* the *stick* to rot in *muck*. It would be tried with *Corns* and *Wens*, and such other *Excrescences*: I would have it also tried with some parts of *living Creatures* that are nearest the *nature* of *Excrescencies*; as the *Combs* of *Cocks*, the *Spurs* of *Cocks*, the *Horns* of *Beasts*, &c. And I would have it tried both ways; both by *rubbing* those parts with *Lard* or *Elder*, as before; and by *cutting off* some *piece* of those parts, and laying it to consume, to see whether it will work any effect towards the *Consumption* of that *part* which was once joyned with it.

It is constantly received and avouched, that the *anointing* of the *Weapon* that maketh the *Wound* will heal the *Wound* it self. In this *Experiment*, upon the relation of *men of credit*, (though my self, as yet, am not fully inclined to believe it) you shall note the *Points* following. First, the *Ointment* wherewith this is done is made of divers *Ingredients*; whereof the strangest and hardest to come by are the *Moss* upon the *skull* of a *dead man unburied*, and the *Fats* of a *Boar* and a *Bear* killed in the *act* of *generation*. These two last I could easily suspect to be prescribed as a starting-hole, that if the *Experiment* proved not, it might be pretended that the *Beasts* were not killed in the due time; for as for the *Moss*, it is certain there is great quantity of it in *Ireland*, upon *slain bodies* laid on *heaps unburied*. The other *Ingredients* are the *Bloud-stone* in *Powder*, and some other *things* which seem to have a *virtue* to *stanch bloud*, as also the *Moss* hath. And the *description* of the *whole Ointment* is to be found in the *Chymical Dispensatory* of *Crollius*. Secondly, the same kind of *Ointment* applied to the *Hurt* it self worketh not the *effect*, but onely applied to the *Weapon*. Thirdly, (which I like well) they do not observe the *confecting* of the *Ointment* under any certain *Constellation*; which commonly is the excuse of *Magical Medicines* when they fail, that they were not made under a *fit Figure* of *Heaven*. Fourthly, it may be applied to the *Weapon*, though the *Party hurt* be at great *distance*. Fifthly, it seemeth the *Imagination* of the *Party* to be *cured* is not needful to concur, for it may be done without the knowledge of the *Party wounded*; and thus much hath been tried, that the *Ointment* (for *Experiment's sake*) hath been wiped off the *Weapon* without the knowledge of the *Party hurt*, and presently the *Party hurt* hath been in great *rage* of *pain* till the *Weapon* was *re-anointed*. Sixthly, it is affirmed, that if you cannot get the *Weapon*, yet if you put an *Instrument* of *Iron* or *Wood*, resembling the *Weapon*, into the *Wound*, whereby it bleedeth, the *anointing* of that *Instrument* will serve and work the *effect*. This I doubt should be a device to keep this strange *form* of *Cure* in request and use, because many times you cannot come by the *Weapon* it self. Seventhly, the *wound* must be at first *washed clean* with *White-wine*, or the *Party's own water*, and then bound up close in *fine Linen*, and no more *dressing* renewed till it be *whole*. Eighthly, the *Sword* it self must be *wrapped up close* as far as the *Ointment* goeth, that it take no *wind*. Ninthly, the *Ointment*, if you wipe it off from the *Sword* and keep it, will *serve again*, and rather *increase* in *virtue* then *diminish*. Tenthly, it will *cure* in far *shorter time* then *Ointments* of *wounds* commonly do. Lastly, it will *cure* a *Beast* as well as a *Man*; which I like best of all the rest, because it subjecteth the *Matter* to an *easy trial*.

I Would have men know, that though I reprehend the *ease passing over* of the *Causes* of *things*, by ascribing them to *secret* and *hidden virtues* and *Proprieties*, (for this hath arrested and laid asleep all true *Inquiry* and *Indications*;) yet I do not understand but that in the *practical part* of *knowledge* much will be left to *Experience* and *Probation*, whereunto *Indication* cannot so fully reach; and this is not onely in *Specie*, but in *Individuo*. So in *Physick*, if you will cure the *Faundies*, it is not enough to say that the *Medicine* must not be *cooling*, for that will hinder the *opening* which the *Disease* requireth; that it must not be *hot*, for that will exasperate *Choler*; that it must go to the *Gall*, for there is the *Obstruction* which causeth the *Disease*, &c. But you must receive from *Experience*, that *Powder* of *Chama-*

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Solitary touch-
ing secret Pro-
prieties.

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pytis, or the like, drunk in *Beer*, is good for the *Faundies*. So again, a wife *Physician* doth not continue still the same *Medicine* to a *Patient*, but he will vary, if the first *Medicine* doth not apparently succeed; for of those *Remedies* that are good for the *Faundies*, *Stone*, *Agues*, &c. that will doe good in one *Body* which will not doe good in another, according to the correspondence the *Medicine* hath to the *Individual Body*.

Experiment
Solitary touch-
ing the general
Sympathy of
mens Spirits.

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THe *delight* which *men* have in *Popularity, Fame, Honour, Submission,* and *Subjection* of other *mens Minds, Wills or Affections* (although these *things* may be desired for other *Ends*) seemeth to be a thing in it self, without contemplation of consequence, grateful, and agreeable to the *nature of man*. This thing (surely) is not without some signification, as if all *Spirits and Souls of men* came forth out of one *divine Limbus*; else why be *men* so much affected with that which others think or say? The best temper of *minds* desireth *good Name* and *true Honour*; the *lighter, Popularity* and *Applause*; the more *depraved, Subjection* and *Tyranny*; as is seen in great *Conquerors* and *Troublers of the World*, and yet more in *Arch-Hereticks*, for the introducing of new *Doctrines* is likewise an *Affectation of Tyranny* over the *Understandings* and *Beliefs of Men*.

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FINIS.



His Lord^{ps} usual Receipt for the *Gout* (to which
the Sixtieth Experiment hath reference) was this.

To be taken in this order.

1. The Poultice.

R. Of Manchet about three Ounces, the Crum onely, thin cut ; let it be
boiled in Milk till it grow to a Pulp ; adde in the end a Dram and a half
of the Powder of Red Roses.

Of Saffron ten Grains.

Of Oil of Roses an Ounce.

Let it be spread upon a Linen Cloth and applied luke-warm , and
continued for three hours space.

2. The Bath or Fomentation.

R. Of Sage-Leaves half an handful.

Of the Root of Hemlock sliced six Drams.

Of Briony Roots half an Ounce.

Of the Leaves of Red Roses two Pugils.

Let them be boiled in a pottle of Water wherein Steel hath been
quenched, till the Liquor come to a quart ; after the straining
put in half an handful of Bay-Salt.

Let it be used with Scarlet-Cloth or Scarlet-Wool dipped in the
Liquor, hot, and so renewed seven times ; all in the space of a
quarter of an hour or little more.

3. The Plaister.

R. Emplastrum Diacalcitheos, as much as is sufficient for the part
you mean to cover ; let it be dissolved with Oil of Roses in such a consi-
stence as will stick, and spread upon a piece of Holland , and applied.



This is the usual Receipt for the Gout (to which the sixteenth Experiment hath reference) was this

To be taken in this order.

1. The Poultice

R. Of Marsh-mallows about three Ounces, the Crust onely, thin cut; let it be boiled in Milk till it grow to a Pulp; add in the end a Dram and a half of the Powder of Red Roses.
Of Cassia ren Ounces.
Of Oil of Roses an Ounce.
Let it be spread upon a Linnen Cloth and applied like warm, and continued for three hours space.

2. The Bath or Emulsion.

R. Of Sage-Laves half an handful.
Of the Root of Hemlock sliced six Drams.
Of Brandy Rose half an Ounce.
Of the Leaves of Red Roses two Pints.
Let them be boiled in a pottle of Water wherein Steel hath been steeped, till the Liquor come to a quart; after the straining put in half an handful of Bay-Salt.
Let it be mixed with Scotch-Cloth or Scotch-Hood dipped in the Liquor, hot and so removed &c. &c. all in the space of a quarter of an hour or little more.

3. The Plaster

R. Emplastum Diacalcitidos as much as is sufficient for the part you mean to cover; let it be dissolved with Oil of Roses in such a quantity as will stick, and spread upon a piece of Holland, and applied.

ARTICLES

OF

ENQUIRY,

TOUCHING

Metals and Minerals.

Written by the Right Honourable,

FRANCIS BACON,

BARON of VERULAM,

Viscount St. *ALBAN*.

Thought fit to be added, to this Work,
of his *NATURAL HISTORY*.

Newly put forth this yeare 1661. by the former
PUBLISHER.



LONDON,

Printed by *S. Griffin*, for *Will. Lee*, at the Turks head
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ARTICLES

OF

ENQUIRY.

TOUCHING

METALS and MINERALS.



The first Letter of the Alphabet is, the Compounding, Incorporating, or Union, of Metals, or Minerals.

With what Metals Gold will incorporate, by Simple Colliquifications, and with what not? And in what quantity it will incorporate; And what Kind of Body the Compound makes?

Gold with Silver, which was the ancient *Electrum*.

Gold with Quick-silver.

Gold with Lead.

Gold with Copper.

Gold with Brasse.

Gold with Iron.

Gold with Tin.

So Likewise of Silver.

Silver with Quick-silver.

Silver with Lead.

Silver with Copper.

Silver with Brasse.

Silver with Iron.

Silver with Tin.

So likewise of Quick-silver.

Quick-silver with Lead.

Quick-silver with Copper.

Quick-silver with Brasse.

Quick-silver with Iron.

Quick-silver with Tin.

So of Lead.

Lead with Copper.

Lead with Brasse.

Lead with Iron.

Lead with Tin.

So of Copper.

Copper with Brasse.

Copper with Iron.

Copper with Tin.

So of Brasse.

Brasse with Iron.

Brasse with Tin.

So of Iron.

Iron with Tin.

What are the Compound Metals, which are common, and known? And what are the Proportions of their Mixtures? As Lattin of Brasse, and the Calaminar-stone.
Bell-metal of, &c.

The counterfeit Plate, which they call Alchumy.

The Decomposites of three Metals, or more, are too long to enquire; Except there be some Compositions of them already observed.

It is also to be observed, Whether any two Metals, which will not mingle of themselves, will mingle with the Help of another; And what?

What Compounds will be made, of Metal, with Stone, and other Fossiles? As Lattin is made with Brasse, and the Calaminar stone. As all the Mettals with Vitriol: All with Iron powdered. All with Flint, &c.

Some few of these would be enquired of, to disclose the Nature, of the rest.

WHether Metals, or other Fossiles, will incorporate with Molten Glasse? And what Body it makes?

The Quantity in the Mixture would we well considered: For some small Quantity, perhaps, would incorporate; As in the Allayes, of Gold, and Silver Coin.

Upon the Compound Body, three Things are chiefly to be observed. The Colour; The Fragility, or Pliantnesse; The Volatility, or Fixation; Compared with the Simple Bodies.

For present use, or profit, this is the Rule. Consider the price, of the two Simple Bodies. Consider again the Dignity, of the one
above

above the other, in use. Then see, if you can make a Compound, that will save more in the price, then it will lose, in the Dignity of the use. As for Example, Consider the Price of Brass Ordnance: Consider again the price of Iron Ordnance: And consider, wherein the Brass Ordnance, doth excell the Iron Ordnance, in use. Then if you can make a Compound, of Brass and Iron Ordnance, that will be near as good in use, and much cheaper in price, there is profit, both to the private, and to the Common-wealth.

So of Gold, and Silver, the price is double of Twelve. The Dignity of Gold above Silver, is not much: The splendour is alike, and more pleasing to some Eye; As in Cloath of Silver, Silver Lace, Silvered Rapiers, &c. The main Dignity is, that Gold bears the Fire, which Silver doth not: But that is an Excellency in Nature, but it is Nothing at all in use. For any Dignity in use, I know none, but that Silvering will fuly, and canker, more then Gilding: Which, if it may be corrected, with a little mixture of Gold, there is profit. And I do somewhat marvel, that the Latter Ages, have lost the ancient Electrum, which was a mixture of Silver with Gold; whereof, I conceive, there may be much use, both in Coine, Plate, and Gilding.

It is to be noted, that there is, in the Version of Metals, Impossibility, or at least great Difficulty; As in making of Gold, Silver, Copper: On the other side, in the Adulterating, or counterfeiting of Metals there is Deceit, and Villany: But it should seem, there is a Middle-way; And that is, by new Compounds; If the wayes of Incorporating were well known.

What Incorporation, or Imbibition, Metals will receive from Vegetables, without being dissolved, might be inquired. As when the Armourers, make their Steele more tough, and plyant, by the Asperion of Water, or Juyce of Herbs: When Gold being grown somewhat Churlish, by recovering, is made more pliant, by throwing in shreads, of Tanned Leather, or by Leather oyled.

Note, that in these, and the like shewes of Imbibition, it were good to try, by the weight, whether the weight be encreased, or no? For if it be not, it is to be doubted, that there is no Imbibition of Substance; But onely, that the Application, of the other Body, doth dispose, and invite, the Metal, to another posture of parts, then of it selfe, it would have taken.

After the incorporation of Metals, by simple Colliquefaction, for the better Discovery of the Nature: And Consents and Dissents of Metals, by incorporating of their Dissolutions, it would be enquired.

What Metals being dissolved, by strong Waters, will incorporate well together, and what not? which is to be inquired particularly, as it was in Colliquefactions.

There is to be observed, in those Dissolutions, which will not incorporate, what the Effects are: As the Ebullition, the Precipitation to the Bottome, the Ejaculation towards the Top, the Suspension in the Middest, and the like.

Note,

Note, that the Dissents of the Menstrua, or strong Waters, may hinder the Incorporation, as well as the Dissents of the Metals themselves: Therefore where the Menstrua are the same, and yet the Incorporation followeth not, you may conclude, the Dissent is in the Metals, but where the Menstrua are severall, not so certain.

THE Second Letter of the Crosse-Row, is the Separation of Metals, and Minerals. Separation is of three sorts. The First is, the separating of the pure Metal, from the Ure, or Dross, which we call Refining. The second is, the Drawing, one Metal, or Mineral, out of another, which we may call Extracting. The third, the separating, of any Metal, into his Originall, or Elements; or call them what you will; Which Work we call Precipitation. For Refining, we are to enquire of it, according to the severall Metals; As Gold, Silver, &c. Incidentally, we are to enquire, of the first Stone, or Ure, or Spar, or Marcasite of Metals severally; And what kinde of Bodies they are; And of the degrees of Richnesse. Also, we are to enquire, of the Meanes of separating, whether by Fire, parting Waters, or otherwise. Also, for the manner of Refining, you are to see, how you can multiply the Heate, or hasten the Opening; And to save charge, in the Refining.

The Meanes of this, is in three Manners: That is to say; In the Blast of the Fire: In the Manner of the Furnace, to multiply Heate, by Union, and Reflexion: And by some Additament, or Medicines, which will helpe the Bodies, to open them the sooner.

Note, the Quickening of the Blast, and the Multiplying, of the Heate, in the Furnace, may be the same, for all Metals; But the Additaments must be severall, according to the Natures of the Metals.

Note again; that if you think the Multiplying, of the Additament, in the same Proportion, that you multiply the Ure, the Worke will follow, you may be deceived: For Quantity in the Passive, will add more resistance, then the same Quantity, in the Active, will add Force.

For Extracting, you are to enquire, what Metals containe others; And likewise what not? as Lead Silver, Copper Silver, &c.

Note, although the Charge of Extraction, should exceed the worth, yet that is not the Matter; For, at least, it will discover Nature, and Possibility; The other may be thought on afterwards.

We are likewise to enquire, what the Differences are, of those Metals, which contain, more or lesse, other Metals; And how that agrees, with the Poornesse, or Richnesse, of the Metals, or Ure,

Use, in themselves. As the Lead, that contains most Silver, is accounted to be more brittle; and yet otherwise poorer in it self.

For Principiation, I cannot affirme, whether there be any such thing, or no. And, I thinke, the Chymists make too much ado about it: But howsoever it be; whether Solution, or Extraction, or a kinde of Conversion, by the Fire, it is diligently to be enquired; What Salts, Sulphur, Vitrioll, Mercury, or the like Simple Bodies, are to be found, in the severall Metals; And in what Quantity.

THe Third Letter of the Crosse-Row, is the Variation, of Metals, into severall Shapes, Bodies, or Natures; The Particulars whereof follow.

Tincture.

Turning to Rust.

Calcination.

Sublimation.

Precipitation.

Amalgamatizing, or turning into a soft Body.

Vitrification.

Opening, or Dissolving into Liquor.

Sprouting, or Branching, or Arborecence.

Induration, and Mollification.

Making tough, or Brittle.

Volatility and Fixation.

Transmutation, or Version.

For Tincture, it is to be enquired, how Metals may be tinted, through and through; And with what, and into what Colours: As Tincting Silver yellow; Tincting Copper white; And tincting Red, Green, Blew; Especially with keeping the Lustre.

Item, Tincture of Glasse.

Item, Tincture of Marble, Flint, or other Stone.

For turning to Rust, two Things are chiefly to be enquired: By what Corrosives it is done; And into what Colours it turns. As Lead into White, which they call *Serus*: Iron into yellow, which they call *Groesus Martis*: Quick-silver into Vermilion; Brasse into Green, which they call *Verdegrais*, &c.

For

For Calcination, to enquire, how every Metal is calcined? And into what-kind of Body? And what is the exquisitest way of Calcination?

For Sublimation, to enquire, the Manner of Subliming; And what Metals indure subliming; And what Body the Sublimate makes?

For Precipitation likewise; By what strong Waters every Metal will precipitate? Or with what Additaments? And in what time? And into what Body?

So for Amalgama, what Metals will endure it? What are the Meanes to do it? And what is the Manner, of the body?

For Vitrification likewise, what Metals will endure it? What are the Meanes to do it? Into what Colour it turns? And further, where the whole Metall is turned into Glasse? And when the Metall doth but hang, in the Glassy part? Also what Weight the vitrified Body bears, compared with the crude Body? Also because Vitrification is accounted, a kinde of Death of Metals, what Vitrification will admit, of turning back again, and what not?

For Dissolution into Liquor, we are to enquire, what is the proper *MENSTRUUM* to dissolve any Metall? And in the Negative, what will touch upon the one, and not upon the other? And what severall Menstrua will dissolve any Metall? And which most exactly? Item, the proceſſe, or Motion, of the Dissolution? The Manner of Risiſg, Boyling, Vapouring? More violent or more gentle? Cauſing much Heate, or leſſe? Item, the Quantity, or charge, the strong Water will beare, and then give over? Item, the Colour into which the Liquor will turne? Above all, it is to be enquired, whether there be any *MENSTRUUM*, to dissolve any Metall, that is not Fretting, and corroding; But openeth the Body by Sympathy, and not by Mordacity, or Violent Penetration?

For Sprouting, or Branching, though it be a Thing but Transitory, and a kinde of Toy, or Pleasure; yet there is a more serious use of it; For that it discovers, the delicate Motions of Spirits, when they put forth, and cannot get forth; like unto that which is in Vegetables.

For Induration, or Mollification, it is to be enquired, what will make Metals harder and harder, and what will make them softer and softer? And this Enquiry tendeth to two Ends;

First, for use; As to make Iron soft by the Fire, makes it malleable.

Secondly,

Secondly, because Induration is a Degree towards Fixation; And Mollification towards Volatility: And therefore the Inquiry of them, will give light towards the other.

For Tough and Brittle, they are much of the same kinde, with the two former, but yet worthy, of an Inquiry apart: Especially to joyne Hardnesse to Toughnesse; As making Glasse malleable, &c. And making Blades, strong to resist, and pierce, and yet not easie to break.

For Volatility, and Fixation, it is a principall Branch, to be enquired. The utmost Degree of Fixation, is, That whereupon no Fire will worke; Nor strong Water joynd with Fire, if there be any such Fixation possible: The next is, when Fire simply will not worke, without Strong Waters: The next is, when it will endure Fire, not blowne, or such a strength of Fire: The next is, when it will not endure Fire, but yet is malleable: The next is, when it is not malleable, but yet it is not fluent, but stupified. So of Volatility; The Utmost Degree is, when it will flee away, without returning: The next is, when it will flee up, but with easie returne: The next, when it will flee upwards, over the Helme, by a kinde of Exufflation, without Vapouring: The next is, when it will melt, though not rise: And the next, when it will soften, though not melt. Of all these, diligent Inquiry is to be made, in severall METALS; Especially of the more extreame Degrees.

For Transmutation, or Version, if it be reall and true, it is the furthest point of Art; And would be well distinguished from Extraction, from Restitution, and from Adulteration. I heare much of turning Iron into Copper: I heare also of the Growth of Lead in weight, which cannot be without a Conversion, of some Body into Lead: But whatsoever is of this kinde, and well approved, is diligently to be inquired, and set down.

THe fourth Letter, of the Cross Row, is Restitution. First therefore, it is to be enquired, in the Negative; what Bodies will never return, either by reason, of their extream Fixing, as in some Vitrifications; or by extream Volatility.

It is also to be enquired, of the two Means of Reduction; And first by the Fire, which is but by Congregation, of Homogeneall parts.

The second is, by drawing them down, by some Body, that hath consent with them: As Iron draweth down Copper, in Water: Gold draweth Quick-silver in vapour: whatsoever is of this kind, is very diligently to be inquired.

Also it is to be enquired, what Time, or Age, will reduce, without the help, of Fire, or Body?

Also, it is to be enquired, what gives Impediment, to Union, or Restitution; which is sometimes called Mortification; As when Quick-silver is mortified, with Turpentine, Spittle, or Butter.

Lastly, it is to be enquired, how the Metal restored, differeth, in any Thing, from the Metal raw or crude? As whether it becometh not more churlish, altered in Colour, or the like?

The BOOK-SELLER unto the Reader.

I Received some Months since these Articles of Enquiry, touching Metals and Minerals: from the hands of the Reverent Dr. Rawley, who hath published several of the Lord Verulams Works since his death (he having been his Lordships Chaplain) and who hath been careful to Correct at the Press this little Piece (an Addition to the Natural History) according to the Original Copy, Remaining amongst his Lordships Manuscripts: amongst which there is nothing more of that subject to be found, so as no more Additions can be expected.

W. Lee.

F I N I S.

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NEW

LE.24.25²

ATLANTIS.

A VVork unfinished.

Written by the Right Honourable , FRANCIS
Lord *Verulam*, Viscount St. *Albans*.



NEW

ATLANTIS

A VVork unfinished.

Written by the Right Honourable, FRANCIS
Lord Verulam, Viscount St. Albans.





TO THE READER.

THIS *Fable* my Lord devised, to the end that he might exhibit therein a *Model* or *Description* of a *College*, instituted for the *Interpreting* of *Nature*, and the producing of great and marvellous *Works* for the benefit of *Men*, under the name of *Solomon's House*, or, *The College of the Six Days Works*. And even so far his *Lordship* hath proceeded as to finish that Part. Certainly the *Model* is more vast and high then can possibly be imitated in all things, notwithstanding most things therein are within *Mens* power to effect. His *Lordship* thought also in this present *Fable* to have composed a *Frame* of *Laws*, or of the best *State* or *Mould* of a *Common-wealth*; but fore-seeing it would be a long *Work*, his desire of *Collecting* the *Natural History* diverted him, which he preferred many degrees before it.

This *Work* of the *New Atlantis* (as much as concerneth the *English Edition*) his *Lordship* designed for this place, in regard it hath so near affinity (in one part of it) with the preceding *Natural History*.

W. Rawley.



This work of the New Alliance (as much as
 concerned the English Edition) his Lordship de-
 signed for this place, in regard it is in a
 affinity (in one part of it) with the preceding
 part of Collecting the Natural History directed
 him, which he preferred many degrees
 before it.

This work of the New Alliance (as much as
 concerned the English Edition) his Lordship de-
 signed for this place, in regard it is in a
 affinity (in one part of it) with the preceding



NEW ATLANTIS.

WE sailed from *Pern* (where we had continued by the space of one whole year) for *China* and *Japan* by the South Sea, taking with us Viſtuals for twelve months, and had good Winds from the Eaſt, though ſoft and weak, for five months ſpace and more; but then the Wind came about, and ſetled in the Weſt for many days, ſo as we could make little or no way, and were ſometimes in purpoſe to turn back: but then again there aroſe ſtrong and great Winds from the South, with a Point Eaſt, which carried us up (for all that we could doe) towards the North; by which time our Viſtuals failed us, though we had made good ſpare of them: So that finding our ſelves in the miſt of the greateſt Wilderneſs of Waters in the world, without Viſtual, we gave our ſelves for loſt men, and prepared for death. Yet we did liſt-up our hearts and voices to GOD above, who ſheweth his Wonders in the Deep, beſeeching him of his mercy, that as in the Beginning he diſcovered the face of the Deep, and brought forth Drie-land, ſo he would now diſcover Land to us, that we might not periſh. And it came to paſs, that the next day about evening we ſaw within a Kenning before us, towards the North, as it were thicker Clouds, which did put us in ſome hope of Land; knowing how that part of the South-ſea was utterly unknown, and might have Iſlands or Continents that hitherto were not come to light. Wherefore we bent our Courſe thither, where we ſaw the appearance of Land all that night; and in the dawning of the next day we might plainly diſcern that it was a Land Flat to our ſight, and full of Boſcage, which made it ſhew the more dark: and after an hour and a half's Sailing we en-

tred into a good *Haven*, being the Port of a fair City, not great indeed, but well built, and that gave a pleasant view from the Sea: And we thinking every minute long till we were on Land, came close to the Shore and offered to land; but straight-ways we saw divers of the People with Bastons in their hands, (as it were) forbidding us to land, yet without any cries or fierceness, but onely as warning us off by signes that they made. Whereupon being not a little discomforted, we were advising with our selves what we should doe. During which time there made forth to us a small Boat with about eight persons in it, whereof one of them had in his hand a Tip-staff of a yellow Cane, tipped at both ends with Blew, who made aboard our Ship without any shew of distrust at all: and when he saw one of our number present himself somewhat afore the rest, he drew forth a little Scroul of Parchment (somewhat yellower then our Parchment, and shining like the leaves of Writing-tables, but otherwise soft and flexible) and delivered it to our foremost man. In which Scroul were written in ancient *Hebrew*, and in ancient *Greek*, and in good *Latine* of the School, and in *Spanish*, these words, *Land ye not, none of you, and provide to be gone from this Coast within sixteen days, except you have further time given you: mean-while, if you want Fresh Water, or Victual, or help for your Sick, or that your Ship needeth repair, write down your wants, and you shall have that which belongeth to mercy.* This Scroul was signed with a stamp of *Cherubims Wings*, not spread, but hanging downwards; and by them a *Cross*. This being delivered, the Officer returned, and left onely a Servant with us to receive our answer. Consulting hereupon amongst our selves, we were much perplexed. The denial of Landing, and hasty warning us away, troubled us much. On the other side, to find that the People had Languages, and were so full of Humanity, did comfort us not a little; and above all, the Sign of the *Cross* to that Instrument was to us a great rejoicing, and, as it were, a certain presage of good. Our answer was in the *Spanish Tongue*, *That for our Ship it was well; for we had rather met with Calms and contrary Winds then any Tempests. For our Sick, they were many, and in very ill case, so that if they were not permitted to land, they ran in danger of their lives. Our other wants we set down in particular, adding, That we had some little store of Morthandize, which if it pleased them to deal for, it might supply our wants without being charge-*

able unto them. We offered some Reward in Pistols unto the Servant, and a piece of Crimson Velvet to be presented to the Officer: but the Servant took them not, nor would scarce look upon them, and so left us, and went back in another little Boat which was sent for him.

About three hours after we had dispatched our Answer, there came towards us a Person (as it seemed) of place. He had on him a Gown with wide Sleeves of a kind of Water-Chamoler, of an excellent Azure Colour, far more glossy then ours; his under-Apparel was green, and so was his Hat, being in the form of a Turbant, daintily made, and not so huge as the *Turkish* Turbants; and the Locks of his Hair came down below the brims of it: A Reverend Man was he to behold. He came in a Boat gilt in some part of it, with four persons more onely in that Boat, and was followed by another Boat wherein were some twenty. When he was come within a flight-shot of our Ship, signes were made to us that we should send forth some to meet him upon the Water: which we presently did in our Ship-boat, sending the principal Man amongst us save one, and four of our number with him. When we were come within six yards of their Boat, they called to us to stay, and not to approach further; which we did: and thereupon the Man whom I before described stood up, and with a loud voice in *Spanish* asked, *Are ye Christians?* We answered, *We were*; fearing the less, because of the *Croß* we had seen in the Subscription. At which answer the said person lift up his Right hand towards Heaven, and drew it softly to his Mouth, (which is the gesture they use when they thank God) and then said, *If you will swear (all of you) by the Merits of the SAVIOUR that ye are no Pirates, nor have shed blood, lawfully nor unlawfully, within forty days past, you may have License to come on Land.* We said, *We were all ready to take that Oath.* Whereupon one of those that were with him, being (as it seemed) a Notary, made an Entry of this Act. Which done, another of the Attendants of the Great Person, which was with him in the same Boat, after his Lord had spoken a little to him, said aloud, *My Lord would have you know, that it is not of Pride or Greatness that he cometh not aboard your Ship; but for that, in your Answer, you declare that you have many sick amongst you, he was warned by the Conservator of Health of the City, that he should keep a distance.* We bowed our selves towards him, and answered, *We were*

were his humble Servants, and accounted for great Honour and singular Humanity towards us that which was already done; but hoped well, that the nature of the sickness of our men was not infectious. So he returned; and a while after came the Notary to us aboard our Ship, holding in his hand a Fruit of that Country like an Orenge, but of Colour between Orenge-tawny and Scarlet, which cast a most excellent Odour: he used it (as it seemeth) for a Preservative against Infection. He gave us our Oath, *By the Name of Jesus and his Merits*; and after told us, that the next day by six of the clock in the morning we should be sent to, and brought to the *Strangers House*, (so he called it) where we should be accommodated of things both for our Whole and for our Sick. So he left us; and when we offered him some Pistolets, he smiling, said, *He must not be twice paid for one labour*; meaning (as I take it) that he had Salary sufficient of the State for his service; for (as I after learned). they call an Officer that taketh Rewards, *Twice paid*.

The next morning early there came to us the same Officer that came to us at first with his Cane, and told us, *He came to conduct us to the Strangers House, and that he had prevented the hour, because we might have the whole day before us for our business*: for (said he) if you will follow my advice, there shall first go with me some few of you and see the place, and how it may be made convenient for you; and then you may send for your sick, and the rest of your number which ye will bring on Land. We thanked him, and said, *That this care which he took of desolate Strangers God would reward*. And so six of us went on Land with him; and when we were on Land, he went before us, and turned to us and said, *He was but our Servant and our Guide*. He led us through three fair Streets, and all the way we went there were gathered some people on both sides, standing in a Row, but in so civil a fashion, as if it had been not to wonder at us, but to welcome us: and divers of them, as we passed by them, put their arms a little abroad, which is their gesture when they bid any welcome. The *Strangers House* is a fair and spacious House, built of Brick, of somewhat a bluer colour than our Brick, and with handsome Windows, some of Glass, some of a kind of Cambrick oiled. He brought us first into a fair Parlour above-stairs, and then asked us, *What number of Persons we were, and how many sick*. We answered, *We were in all (sick and whole) one and fifty persons, whereof*

our sick were seventeen. He desired us to have patience a little, and to stay till he came back to us, which was about an hour after: and then he led us to see the Chambers which were provided for us, being in number nineteen. They having cast it (as it seemeth) that four of those Chambers, which were better then the rest, might receive four of the principal men of our Company, and lodge them alone by themselves; and the other fifteen Chambers were to lodge us, two and two together: the Chambers were handsome and chearful Chambers, and furnished civilly. Then he led us to a long Gallery, like a Dorture, where he shewed us all along the one side (for the other side was but Wall and Window) seventeen Cells, very neat ones, having partitions of Cedar-wood. Which Gallery and Cells, being in all 40, (many more then we needed) were instituted as an Infirmary for sick persons. And he told us withall, that as any of our sick waxed well, he might be removed from his Cell to a Chamber; for which purpose there were set forth ten spare Chambers, besides the number we spake of before. This done, he brought us back to the Parlour, and lifting up his Cane a little (as they doe when they give any Charge or Command) said to us, *Ye are to know, that the Custom of the Land requireth, that after this day and to morrow (which we give you for removing your People from your Ship) you are to keep within doors for three days: But let it not trouble you, nor do not think your selves restrained, but rather left to your Rest and Ease. You shall want nothing, and there are six of our People appointed to attend you for any business you may have abroad.* We gave him thanks with all affection and respect, and said, *GOD surely is manifested in this Land.* We offered him also twenty Pistolets: but he smiled, and onely said, *What, twice paid?* and so he left us. Soon after our Dinner was served in, which was right good Viands, both for Bread and Meat, better then any Collegiate Diet that I have known in Europe. We had also drink of three sorts, all wholesome and good; Wine of the Grape; a Drink of Grain, such as is with us our Ale, but more clear; and a kind of Sider made of a Fruite of that Country, a wonderful pleasing and refreshing Drink. Besides, there were brought in to us great store of those Scarlet Orengees for our Sick, which (they said) were an assured Remedy for sickness taken at Sea. There was given us also a Box of small gray or whitish Pills, which they wished our Sick should take, one of the Pills

every night before sleep, which (they said) would hasten their Recovery. The next day, after that our trouble of carriage and removing of our men and goods out of our Ship was somewhat settled and quiet, I thought good to call our Company together, and when they were assembled said unto them, My dear friends, let us know our selves, and how it standeth with us. We are men cast on Land, as Jonas was out of the Whale's belly, when we were as buried in the Deep: and now we are on Land, we are but between Death and Life, for we are beyond both the Old World and the New, and whether ever we shall see Europe GOD onely knoweth: It is a kind of Miracle hath brought us hither, and it must be little less that shall bring us hence. Therefore in regard of our deliverance past, and our danger present and to come, let us look up to GOD, and every man reform his own ways. Besides, we are come here amongst a Christian People, full of Piety and Humanity; let us not bring that confusion of face upon our selves, as to shew our vices or unworthiness before them. Yet there is more; for they have by commandment (though in form of courtesie) cloistered us within these Walls for three days: who knoweth whether it be not to take some taste of our manners and conditions; and if they find them bad, to banish us straightways; if good, to give us further time? For these men that they have given us for attendance may withall have an eye upon us. Therefore for God's love, and as we love the weal of our Souls and Bodies, let us so behave our selves as we may be at peace with GOD, and may find grace in the eyes of this People. Our Company with one voice thanked me for my good admonition, and promised me to live soberly and civilly, and without giving any the least occasion of offence. So we spent our three days joyfully and without care, in expectation what would be done with us when they were expired: during which time we had every hour joy of the amendment of our sick, who thought themselves cast into some Divine Pool of Healing, they mended so kindly and so fast.

The morrow after our three days were past, there came to us a new man that we had not seen before, clothed in blew as the former was, save that his Turbant was white with a small red Cross on the top; he had also a Tippet of fine Linnen. At his coming in he did bend to us a little, and put his arms abroad. We of our parts saluted him in a very lowly and submissive manner, as looking that from him we should receive Sentence of Life or Death. He desired to speak with
some

some few of us; whereupon six of us onely stayed, and the rest avoided the Room. He said, I am by office Governour of this House of Strangers, and by Vocation I am a Christian Priest; and therefore am come to you to offer you my service both as Strangers, and chiefly as Christians. Some things I may tell you, which I think you will not be unwilling to hear. The State hath given you licence to stay on Land for the space of six weeks: And let it not trouble you if your occasions ask further time; for the Law in this point is not precise; and I do not doubt but my self shall be able to obtain for you such further time as shall be convenient. Ye shall also understand, that the Strangers House is at this time rich and much afore-hand, for it hath laid up Revenue these 37 years; for so long it is since any Stranger arrived in this part: And therefore take ye no care, the State will defray you all the time you stay, neither shall you stay one day less for that. As for any Merchandize you have brought, ye shall be well used, and have your Return either in Merchandize, or in Gold and Silver; for to us it is all one. And if you have any other Request to make, hide it not, for ye shall find we will not make your countenance to fall by the answer ye shall receive. Onely this I must tell you, that none of you must go above a Karan (that is with them a mile and an half) from the Walls of the City without special leave. We answered, after we had looked a while upon one another, admiring this gracious and Parent-like usage, That we could not tell what to say, for we wanted words to express our thanks, and his noble free Offers left us nothing to ask. It seemed to us that we had before us a Picture of our Salvation in Heaven; for we that were a while since in the jaws of Death, were now brought into a place where we found nothing but Consolations. For the Commandment laid upon us, we would not fail to obey it, though it was impossible but our hearts should be inflamed to tread further upon this Happy and Holy Ground. We added, That our Tongues should first cleave to the roofs of our Mouths ere we should forget either this Reverend Person, or this whole Nation, in our Prayers. We also most humbly besought him to accept of us as his true Servants, by as just a Right as ever men on earth were bounden, laying and presenting both our Persons and all we had at his feet. He said, He was a Priest, and looked for a Priest's reward, which was our Brotherly love; and the good of our Souls and Bodies. So he went from us, not without Tears of tenderness in his Eyes, and left us also confused with joy and kindness, saying amongst our selves, That we were come into a Land of Angels,

which did appear to us daily, and present us with Comforts which we thought not of, much less expected.

The next day about ten of the clock the Governour came to us again, and after Salutations said familiarly, That he was come to visit us, and called for a Chair and sate him down: and we being someten of us (the rest were of the meaner sort, or else gone abroad) sate down with him: and when we were set he began thus; We of this Island of Bensalem (for so they call it in their Language) have this, That by means of our solitary situation, and of the Laws of Secrecy which we have for our Travellers, and our rare admission of Strangers, we know well most part of the Habitable World, and are our selves unknown. Therefore because he that knoweth least is fittest to ask Questions, it is more reason, for the entertainment of the time, that ye ask me Questions then that I ask you. We answered, That we humbly thanked him that he would give us leave so to doe, and that we conceived by the taste we had already, that there was no worldly thing on earth more worthy to be known then the state of that happy Land. But above all (we said) since that we were met from the several Ends of the World, and hoped assuredly that we should meet one day in the Kingdom of Heaven, (for that we were both parts Christians) we desired to know (in respect that Land was so remote, and so divided by vast and unknown Seas from the Land where our SAVIOUR walked on Earth) who was the Apostle of that Nation, and how it was converted to the Faith. It appeared in his face that he took great contentment in this our Question. He said, Ye knit my heart to you by asking this Question in the first place, for it sheweth that you first seek the Kingdom of Heaven, and I shall gladly and briefly satisfie your demand.

About twenty years after the Ascension of our SAVIOUR it came to pass that there was seen by the People of Rensula (a City upon the Eastern Coast of our Island,) within night, (the night was cloudy and calm) as it might be some mile in the Sea, a great Pillar of Light, not sharp, but in form of a Column or Cylinder, rising from the Sea a great way up towards Heaven, and on the top of it was seen a large Cross of Light, more bright and resplendent then the body of the Pillar: Upon which so strange a Spectacle the People of the City gathered apace together upon the Sands to wonder, and so after put themselves into a number of small Boats to go nearer to this marvellous Sight. But when the Boats were come within (about) sixty yards of the Pillar, they found themselves all bound, and

and could go no further, yet so as they might move to go aboard, but might not approach nearer; so as the Boats stood all as in a Theatre, beholding this Light as an Heavenly Sign. It so fell out that there was in one of the Boats one of the Wise Men of the Society of Solomon's House, (which House or College (my good Brethren) is the very Eye of this Kingdom) who having a while attentively and devoutly viewed and contemplated this Pillar and Cross, fell down upon his face, and then raised himself upon his knees, and lifting up his hands to Heaven made his Prayers in this manner.

Lord God of Heaven and Earth, thou hast vouchsafed of thy Grace to those of our Order to know thy Works of Creation and true Secrets of them, and to discern (as far as appertaineth to the Generations of Men) between Divine Miracles, Works of Nature, Works of Art, and Impostures and Illusions of all sorts. I do here acknowledge and testifie before this People that the Thing we now see before our eyes is thy Finger, and a true Miracle. And forasmuch as we learn in our Books that thou never workest Miracles but to a Divine and Excellent End, (for the Laws of Nature are thine own Laws, and thou exceedest them not but upon good cause) we most humbly beseech thee to prosper this great Sign, and to give us the Interpretation and use of it in mercy, which thou dost in some part secretly promise, by sending it unto us.

When he had made his Prayer he presently found the Boat he was in moveable and unbound, whereas all the rest remained still fast; and taking that for an assurance of leave to approach, he caused the Boat to be softly and with silence rowed towards the Pillar: but ere he came near it the Pillar and Cross of Light brake up, and cast itself abroad as it were into a Firmament of many Stars; which also vanished soon after, and there was nothing left to be seen but a small Ark or Chest of Cedar, dry and not wet at all

all with water, though it swam; and in the fore-end of it, which was towards him, grew a small green Branch of Palm. And when the Wise man had taken it with all reverence into his Boat, it opened of it self, and there was found in it a Book and a Letter, both written in fine Parchment, and wrapped in Sindons of Linen. The Book contained all the Canonical Books of the Old and New Testament, according as you have them, (for we know well what the Churches with you receive :) and the Apocalypse it self, and some other Books of the New Testament, which were not at that time written, were nevertheless in the Book. And for the Letter, it was in these words:

I Bartholomew, a Servant of the Highest, and Apostle of **JESUS CHRIST**, was warned by an Angel that appeared to me in a Vision of Glory, that I should commit this Ark to the floods of the Sea. Therefore I doe testifie and declare unto that People where **GOD** shall ordain this Ark to come to Land, that in the same day is come unto them Salvation, and Peace, and Good will from the Father, and from the **LORD JESUS**.

There was also in both these Writings, as well the Book as the Letter, wrought a great Miracle, conform to that of the Apostles in the Original Gift of Tongues. For there being at that time in this Land Hebrews, Persians and Indians, besides the Natives, every one read upon the Book and Letter as if they had been written in his own Language. And thus was this Land saved from Infidelity (as the Remain of the Old World was from Water) by an Ark, through the Apostolical and Miraculous Evangelism of S. Bartholomew. And here he paused, and a Messenger came and called him forth from us. So this was all that passed in that Conference.

The next day the same Governour came again to us immediately after Dinner, and excused himself, saying, That the day before he was called from us somewhat abruptly, but now he would make us amends, and spend time with us, if we held his Company and Conference agreeable. We answered, That we held it so agreeable and pleasing to us, as we forgot both Dangers past and

Fears

Fears to come for the time we heard him speak, and that we thought an hour spent with him was worth years of our former life. He bowed himself a little to us, and after we were set again he said, Well, the Questions are on your part. One of our number said, after a little pause, That there was a matter we were no less desirous to know then fearful to ask, lest we might presume too far; but encouraged by his rare Humanity towards us, (that could scarce think our selves strangers, being his vowed and professed Servants) we would take the hardiness to propound it humbly beseeching him, if he thought it not fit to be answered, that he would pardon it, though he rejected it. We said, We well observed those his words which he formerly spake, That this happy Island where we now stood was known to few, and yet knew most of the Nations of the world; which we found to be true, considering they had the Languages of Europe, and knew much of our state and business; and yet we in Europe (notwithstanding all the remote Discoveries and Navigations of this last Age) never heard any of the least inkling or glimpse of this Island. This we found wonderful strange, for that all Nations have interknowledge one of another, either by Voiage into Forein Parts, or by Strangers that come to them: And though the Traveller into a Forein Country doth commonly know more by the Eye then he that stayed at home can by relation of the Traveller; yet both ways suffice to make a mutual knowledge in some degree on both parts. But for this Island, we never heard tell of any Ship of theirs that had been seen to arrive upon any Shore of Europe, no nor of either the East or West Indies, nor yet of any Ship of any other part of the world that had made return for them. And yet the marvel rested not in this; for the situation of it (as his Lordship said) in the secret Conclave of such a vast Sea might cause it: But then, that they should have knowledge of the Languages, Books, Affairs of those that lie such a distance from them, it was a thing we could not tell what to make of; for that it seemed to us a condition and propriety of Divine Powers and Beings, to be hidden and unseen to others, and yet to have others open and as in a light to them. At this speech the Governour gave a gracious smile, and said, That we did well to ask pardon for this Question we now asked, for that it imported as if we thought this Land a Land of Magicians, that sent forth Spirits of the Air into all parts to bring them news and intelligence of other Countries. It was answered by us all in all possible humbleness, but yet with a countenance taking knowledge that we knew that he

he spake it but merrily, That we were apt enough to think there was somewhat supernatural in this Island, but yet rather as Angelical then Magical. But to let his Lordship know truly what it was that made us tender and doubtfull to ask this Question, it was not any such conceit, but because we remembered he had given a touch in his former Speech, that this Land had Laws of Secrecy touching Strangers. To this he said, You remember it right: and therefore in that I shall say to you I must reserve some particulars, which it is not lawfull for me to reveal, but there will be enough left to give you satisfaction.

You shall understand (that which perhaps you will scarce think credible) that about three thousand years ago, or somewhat more, the Navigation of the World (specially for remote Voiages) was greater then at this day. Do not think with your selves that I know not how much it is increased with you within these threescore years; I know it well; and yet I say, greater then then now: Whether it was that the example of the Ark, that saved the remnant of Men from the Universal Deluge, gave men confidence to adventure upon the Waters, or what it was, but such is the truth. The Phœnicians, and specially the Tyrians, had great Fleets; so had the Carthaginians their Colony, which is yet further West: Toward the East the Shipping of Egypt and of Palestina was likewise great; China also and the great Atlantis, (that you call America) which have now but Junks and Canoa's, abounded then in tall Ships. This Island (as appeareth by faithful Registers of those times) had then fifteen hundred strong Ships of great content. Of all this there is with you sparing memory or none, but we have large knowledge thereof.

At that time this Land was known and frequented by the Ships and Vessels of all the Nations before named, and (as it cometh to pass) they had many times men of other Countries that were no Sailers that came with them, as Persians, Chaldeans, Arabians; so as almost all Nations of might and fame resorted hither, of whom we have some Stirps and little Tribes with us at this day. And for our own Ships, they went sundry Voiages, as well to your Streights, which you call the Pillars of Hercules, as to other parts in the Atlantick and Mediterrane Seas; as to Peguin (which is the same with Cambalu) and Quinsay upon the Oriental Seas, as far as to the Borders of the East Tartary.

At the same time, and on Age after or more, the Inhabitants of the great Atlantis did flourish. For though the Narration and Description

scription which is made by a great Man with you, of the Dependents of Neptune, planted there; and of the magnificent Temple, Palace, City and Hills, and the manifold Streams of goodly Navigable Rivers, which (as for many Chains) inwound the same Site and Temple; and the several degrees of Ascent whereby men did climb up to the same, as if it had been a Soale Cech, be all Poetical and Fabulous; yet so much is true, that the said Country of Atlantis, as well that of Peru, then called Coya, as that of Mexico, then named Tyrambel, were mighty and proud Kingdoms in Antient Shipping and Riches; so mighty, as at one time (or at least within the space of ten years) they both made two great Expeditions, they of Tyrambel through the Atlantick to the Mediterranean Sea, and they of Coya through the South-sea upon this our Island. And for the former of these, which was into Europe, the same Author amongst you (as it seemeth) had some relation from the Egyptian Priest whom he citeth, for assuredly such a thing there was. But whether it were the ancient Athenians that had the glory of the Repulse and Resistance of those Forces, I can say nothing: but certain it is, there never came back either Ship or Man from that Voiage. Neither had the other Voiage of those of Coya upon us had better fortune, if they had not met with enemies of greater clemency. For the King of this Island, (by name Altabin) a wise man and a great Warrior, knowing well both his own strength and that of his Enemies, handled the matter so, as he cut off their Land-forces from their Ships, and entailed both their Navy and their Camp with a greater power then theirs both by Sea and Land, and compelled them to render themselves without striking stroke; and after they were at his mercy, contenting himself onely with their Oath that they should no more bear Arms against him, dismissed them all in safety. But the Divine revenge overtook not long after those proud Enterprises; for within less then the space of one hundred years the Great Atlantis was utterly lost and destroyed, not by a great Earthquake, as your Man saith, (for that whole Tract is little subject to Earthquakes) but by a particular Deluge or Inundation, those Countries having at this day farre greater Rivers, and farre higher Mountains to pour down Waters, then any part of the Old World. But it is true, that the same Inundation was not deep, not past forty foot in most places from the ground; so that although it destroyed Man and Beast generally, yet some few wild Inhabitants of the Wood escaped. Birds also were saved by flying to the high Trees and Woods. For as for Men, although they had

Buildings in many places higher then the depth of the Water ; yet that Inundation , though it were shallow , had a long continuance , whereby they of the Vale , that were not drowned , perished for want of food and other things necessary . So as marvel you not at the thin Population of America , nor at the Rudeness and Ignorance of the People ; for you must account your Inhabitants of America as a young People , younger a thousand years at the least then the rest of the world , for that there was so much time between the Universal Flood and their Particular Inundation . For the poor remnant of Humane Seed which remained in their Mountains Peopled the Country again slowly , by little and little . And being simple and a Savage People (not like Noah and his Sons , which was the chief Family of the Earth) they were not able to leave Letters , Arts and Civility to their Posterity . And having likewise in their Mountainous Habitations been used (in respect of the extreme Cold of those Regions) to cloath themselves with the skins of Tigers , Bears , and great hairy Goats that they have in those Parts ; when after they came down into the Valley , and found the intolerable Heats which are there , and knew no means of lighter Apparel , they were forced to begin the custom of going Naked , which continueth at this day : Onely they take great pride and delight in the Feathers of Birds : and this also they took from those their Ancestors of the Mountains , who were invited unto it by the infinite flight of Birds that came up to the high Grounds while the Waters stood below . So you see by this main accident of Time we lost our Traffick with the Americans , with whom , of all others , in regard they lay nearest to us , we had most Commerce . As for the other parts of the world , it is most manifest that in the Ages following (whether it were in respect of Wars , or by a Natural Revolution of Time) Navigation did every where greatly decay , and especially far Voyages (the rather by the use of Gallies and such Vessels as could hardly brook the Ocean) were altogether left and omitted . So then , that part of Entercourse which could be from other Nations to sail to us , you see how it hath long since ceased , except it were by some rare Accident , as this of yours . But now of the cessation of that other part of Entercourse , which might be by our sailing to other Nations , I must yield you some other cause : for I cannot say (if I should say truly) but our Shipping for Number , Strength , Mariners , Pilots , and all things that appertain to Navigation , is as great as ever ; and there-

therefore why we should sit at home I shall now give you an account by it self, and it will draw neerer to give you satisfaction to your principal Question.

There reigned in this Island, about 1900 years ago, a King, whose memory of all others we most adore, not Superstitiously, but as a Divine Instrument, though a Mortal Man: his Name was Salomona, and we esteem him as the Law-giver of our Nation. This King had a large heart inscrutable for good, and was wholly bent to make his Kingdom and People happy: He therefore taking into consideration how sufficient and substantive this Land was to maintain it self without any aid (at all) of the Foreiner, being 5600 miles in circuit, and of rare fertility of soil in the greatest part thereof, and finding also the Shipping of this Country might be plentifully set on work, both by Fishing, and by Transportations from Port to Port, and likewise by sailing unto some small Islands that are not far from us, and are under the Crown and Laws of this State; and recalling into his memory the happy and flourishing estate wherein this Land then was, so as it might be a thousand ways altered to the worse, but scarce any one way to the better; thought nothing wanted to his Noble and Heroical Intentions but onely (as far as Humane foresight might reach) to give perpetuity to that which was in his time so happily established: therefore amongst his other Fundamental Laws of this Kingdom he did ordain the Interdicts and Prohibitions which we have touching Entrance of Strangers, which at that time (though it was after the Calamity of America) was frequent, doubting Novelties and commixture of Manners. It is true, the like Law against the admission of Strangers without licence is an ancient Law in the Kingdom of China, and yet continued in use; but there it is a poor thing, and hath made them a curious, ignorant, fearful, foolish Nation. But our Law-giver made his Law of another temper. For first, he hath preserved all points of Humanity, in taking Order and making Provision for the Relief of Strangers distressed, whereof you have tasted. At which speech (as reason was) we all rose up and bowed our selves. He went on. That King also still desiring to joyn Humanity and Policy together, and thinking it against Humanity to detain Strangers here against their wills, and against Policy, that they should return and discover their knowledge of this State, he took this course: He did ordain, that of the Strangers that should be permitted to Land, as many (at all times) might depart as would, but as many as would stay should have very good conditions and means to live from

from the State. Wherein he saw so far, that now in so many Ages since the Prohibition we have memory not of one Ship that ever returned, and but of thirteen persons onely at several times that chose to return in our Bottoms. What those few that returned may have reported abroad, I know not; but you must think, whatsoever they have said could be taken where they came but for a Dream. Now for our Travelling from hence into Parts abroad, our Law-giver thought fit altogether to restrain it. So is it not in China, for the Chineses sail where they will, or can; which sheweth that their Law of keeping out Strangers is a Law of pusillanimity and fear. But this restraint of ours hath one onely Exception, which is admirable, preserving the Good which cometh by communicating with Strangers, and avoiding the Hurt; and I will now open it to you. And here I shall seem a little to digress, but you will by and by find it pertinent. Ye shall understand (my dear friends) that amongst the excellent acts of that King one above all hath the preeminence: It was the Erection and Institution of an Order or Society which we call Solomon's House, the noblest Foundation (as we think) that ever was upon the Earth, and the Lantern of this Kingdom. It is dedicated to the Study of the Works and Creatures of G O D. Some think it beareth the Founder's name a little corrupted, as if it should be Salomon's House: but the Records write it as it is spoken; so as I take it to be denominate of the King of the Hebrews, which is famous with you, and no stranger to us, for we have some parts of his Works which with you are lost, namely, that Natural History which he wrote of all Plants, from the Cedar of Libanus to the Moss that groweth out of the Wall, and of all things that have Life and Motion. This maketh me think that our King finding himself to symbolize in many things with that King of the Hebrews (which lived many years before him) honoured him with the Title of this Foundation. And I am the rather induced to be of this opinion, for that I find in ancient Records this Order or Society is sometimes called Solomon's House, and sometimes the College of the Six Days Works; whereby I am satisfied that our Excellent King had learned from the Hebrews, that G O D had created the World and all that therein is within six days, and therefore he instituting that House for the finding out of the true Nature of all things (whereby G O D might have the more Glory in the Workmanship of them, and Men the more Fruit in their Use of them) did give it also that second name. But now to come to our present purpose. When the King had forbidden to all his People Navigation

gation in any Part that was not under his Crown, he made nevertheless this Ordinance, That every twelve years there should be set forth out of this Kingdom two Ships appointed to several Voiages; that in either of these Ships there should be a Mission of three of the Fellows or Brethren of Solomon's House, whose errand was onely to give us knowledge of the Affairs and State of those Countries to which they were designed, and especially of the Sciences, Arts, Manufactures and Inventions of all the world; and withall to bring unto us Books, Instruments, and Patterns in every kind: That the Ships after they had landed the Brethren should return, and that the Brethren should stay abroad till the new Mission. The Ships are not otherwise fraught then with store of Victuals, and good quantity of Treasure, to remain with the Brethren for the buying of such things and rewarding of such Persons as they should think fit. Now for me to tell you how the vulgar sort of Mariners are contained from being discovered at Land, and how they that must be put on shore for any time colour themselves under the names of other Nations, and to what places these Voiages have been designed, and what places of Rendezvous are appointed for the new Missions, and the like Circumstances of the Practick, I may not doe it, neither is it much to your desire. But thus you see we maintain a Trade, not for Gold, Silver, or Jewels, nor for Silks, nor for Spices, nor any other Commodity of Matter, but onely for God's first Creature, which was Light; to have Light (I say) of the growth of all parts of the World. And when he had said this he was silent, and so were we all; for indeed we were all astonished to hear so strange things so probably told. And he perceiving that we were willing to say somewhat, but had it not ready, in great courtesie took us off, and descended to ask us questions of our Voiage and Fortunes; and in the end concluded, that we might doe well to think with our selves what time of stay we would demand of the State; and bad us not to scant our selves, for he would procure such time as we desired. Whereupon we all rose up and presented our selves to kiss the skirt of his Tippet; but he would not suffer us, and so took his leave. But when it came once amongst our People, that the State used to offer Conditions to Strangers that would stay, we had work enough to get any of our men to look to our Ship, and to keep them from going presently to the Governour to crave Conditions: but with much ado we refrained them till we might agree what course to take.

We took our selves now for free-men, seeing there was no danger of our utter perdition, and lived most joyfully, going abroad, and seeing what was to be seen in the City and places adjacent within our *Tedder*, and obtaining acquaintance with many of the City, not of the meanest quality, at whose hands we found such humanity, and such a freedome and desire to take Strangers as it were into their bosom, as was enough to make us forget all that was dear to us in our own Countries; and continually we met with many things right worthy of observation and relation: as indeed, if there be a *Mirroure* in the world worthy to hold mens eyes, it is that Country. One day there were two of our company bidden to a *Feast* of the *Family*, as they call it: a most natural, pious and reverend Custom it is, shewing that Nation to be compounded of all goodness. This is the manner of it: It is granted to any man that shall live to see thirty persons descended of his body alive together, and all above three years old, to make this *Feast*, which is done at the cost of the State. The *Father* of the *Family*, whom they call the *Tirfan*, two days before the *Feast* taketh to him three of such friends as he liketh to chuse, and is assisted also by the Governour of the City or place where the *Feast* is celebrated; and all the *Persons* of the *Family* of both Sexes are summoned to attend him. These two days the *Tirfan* sitteth in consultation concerning the good estate of the *Family*: there, if there be any discord or Suits between any of the *Family*, they are compounded and appeased; there, if any of the *Family* be distressed or decayed, order is taken for their relief and competent means to live; there, if any be subject to vice or take ill courses, they are reprov'd and censured. So likewise, direction is given touching Marriages, and the courses of life which any of them should take, with divers other the like Orders and Advices. The Governour assisteth to the end, to put in execution by his publick Authority the Decrees and Orders of the *Tirfan*, if they should be disobeyed, though that seldom needeth; such reverence and obedience they give to the order of Nature. The *Tirfan* doth also then ever chuse one man from amongst his Sons to live in house with him, who is called ever after the *Son of the Vine*; the reason will hereafter appear. On the *Feast-day* the *Father* or *Tirfan* cometh forth after Divine Service into a large Room where the *Feast* is celebrated; which Room hath an Half-

pace at the upper end. Against the wall, in the middle of the Half-pace, is a Chair placed for him, with a Table and Canper before it. Over the Chair is a State made bound or bval, and it is of Ivy; an Ivy somewhat whiter than ours, like the leaf of a silver Asp, but more shining; for it is green all Winter. And the State is curiously wrought with Silver and Silk of divers colours, broiding or binding in the Ivy, and is set of the work of some of the Daughters of the Family, and veiled over at the top with a fine Net of Silk and Silver, but the substance of it is true Ivy, whereof, after it is taken down, the Friends of the Family are desirous to have some leaf or sprig to keep. The *Turfan* cometh forth with all his Generation, of Lineage, the Males before him, and the Females following him. And if there be a Mother from whose body the whole Lineage is descended, there is a Traverse placed in a loft above on the right hand of the Chair, with a privy Door, and a carved Window of Glass, leaded with Gold and Beryl, where she sitteth, but is not seen. When the *Turfan* is come forth, he setteth down in the Chair, and all the Lineage place themselves against the Wall, both at his back, and upon the Return of the Half-pace, in order of their years, without difference of Sex, and stand upon their feet. When he is set, the room being always full of company, but well kept, and without disorder, after some pause there cometh in from the lower end of the room a *Taratan*, (which is as much as an *Herald*;) and on either side of him two young Lads, whereof one carrieth a Scroul of their shining yellow Parchment, and the other a Cluster of Grapes of Gold, with a long foot or stalk: the *Herald* and Children are clothed with Mantles of Sea-water-green Sattin, but the *Herald's* Mantle is stream'd with Gold, and hath a Train. Then the *Herald* with three Courtesies, or rather Inclinations, cometh up as far as the Half-pace, and there first taketh into his hand the Scroul. This Scroul is the King's Charter, containing Gift of Revenue, and many Privileges, Exemptions, and Points of Honour granted to the Father of the Family, and it is even styled and directed, To such one, Our well-beloved Friend and Creditor, which is a Title proper onely to this case: For they say, the King is Debtor to no man, but for propagation of his Subjects. The Seal set to the King's Charter is the King's Image, imbossed or moulded in Gold. And though such Charters be expedited of course, and

as of right; yet they are varied by discretion; according to the number and dignity of the Family. This Charter the Herald readeth aloud; and while it is read, the Father or Tisfan standeth up; supported by two of his Sons, such as he chooseth. Then the Herald mounteth the Half-pace; and delivereth the Charter into his hand; and with that there is an acclamation by all that are present in their Language, which is thus much, *Happy are the People of Bensalem.* Then the Herald taketh into his hand from the other Child the Cluster of Grapes, which is of Gold, both the Stalk and the Grapes; but the Grapes are faintly enamelled; and if the Males of the Family be the greater number, the Grapes are enamelled Purple, with a little Sun set on the top; if the Females, then they are enamelled into a greenish yellow, with a Crescent on the top. The Grapes are in number as many as there are descendants of the Family. This Golden Cluster the Herald delivereth also to the Tisfan, who presently delivereth it over to that Son that he had formerly chosen to be in house with him; who beareth it before his Father as an Ensign of Honour when he goeth in Publick ever after; and is thereupon called the Son of the Vine. After this Ceremony ended, the Father or Tisfan retireth, and after some time cometh forth again to Dinner, where he sitteth alone under the State as before; and none of his Descendants sit with him, of what degree or dignity soever, except he hap to be of Solomon's House. He is served onely by his own Children, such as are Male, who perform unto him all service of the Table upon the knee; and the Women onely stand about him leaning against the wall. The Room below his Half-pace hath Tables on the sides for the Guests that are bidden, who are served with great and comely order; and toward the end of Dinner (which in the greatest Feasts with them lasteth never above an hour and a half) there is an Hymn sung, varied according to the Invention of him that composed it, (for they have excellent Poetrie;) but the Subject of it is (always) the praises of Adam, and Noah, and Abraham; whereof the former two Peopled the World, and the last was the Father of the Faithful: concluding ever with a Thanksgiving for the Nativity of our Saviour, in whose Birth the births of all are onely blessed. Dinner being done, the Tisfan retireth again; and having withdrawn himself alone into a place where he maketh some private prayers, he cometh forth the third time to give the Blessing,

sing, with all his Descendants, who stand about him as at the first. Then he calleth them forth by one and by one by name, as he pleaseth, though seldom the order of age be inverted. The person that is called (the Table being before removed) kneeleth down before the Chair, and the Father layeth his hand upon his head, or her head, and giveth the Blessing in these words; Son of Bensalem, (or Daughter of Bensalem) thy Father saith it, the man by whom thou hast breath and life speaketh the word; The Blessing of the Everlasting Father, the Prince of Peace, and the Holy Dove be upon thee, and make the days of thy Pilgrimage good and many. This he saith to every of them: and that done, if there be any of his Sons of eminent Merit and Vertue, (so they be not above two) he calleth for them again, and saith, laying his arm over their shoulders, they standing, Sons, it is well you are born; give God the praise, and persevere to the end: and withall delivereth to either of them a Jewel, made in the figure of an Ear of Wheat, which they ever after wear in the front of their Turbant or Hat. This done, they fall to Musick and Dances and other Recreations after their manner for the rest of the day. This is the full order of that Feast.

By that time six or seven days were spent, I was fallen into straight acquaintance with a Merchant of that City, whose name was Joabin: he was a Jew and Circumcised: for they have some few stirps of Jews yet remaining among them, whom they leave to their own Religion; which they may the better doe, because they are of a far differing Disposition from the Jews in other parts. For whereas they hate the Name of CHRIST, and have a secret inbred rancour against the People among whom they live, these (contrariwise) give unto our SAVIOUR many high Attributes, and love the Nation of Bensalem extremely. Surely this man, of whom I speak, would ever acknowledge that CHRIST was born of a Virgin, and that he was more then a Man; and he would tell how GOD made him Ruler of the Seraphims which guard his Throne: and they call him also the Milken way, and the Eliab of the Messiah, and many other high Names; which though they be inferiour to his Divine Majesty, yet they are far from the Language of other Jews. And for the Country of Bensalem, this man would make no end of commending it, being desirous, by Tradition among the Jews there, to have it believed, that the

People thereof were of the generations of *Abraham* by another son, whom they call *Nachoran*; and that *Moses* by a secret *Cabala* ordained the Laws of *Bensalem* which they now use; and that when the *Messiah* should come and sit in his Throne at *Hierusalem*, the King of *Bensalem* should sit at his feet, whereas other Kings should keep a great distance. But yet setting aside these *Jewish* Dreams, the man was a wise man and learned, and of great policy, and excellently seen in the Laws and Customs of that Nation. Amongst other discourses, one day I told him, I was much affected with the Relation I had from some of the Company, of their Custom in holding the Feast of the Family, for that (me-thought) I had never heard of a Solemnity wherein Nature did so much preside. And because Propagation of Families proceedeth from the Nuptial Copulation, I desired to know of him what Laws and Customs they had concerning Marriage, and whether they kept Marriage well, and whether they were tied to one Wife. For that where Population is so much affected, and such as with them it seemed to be, there is commonly permission of Plurality of Wives. To this he said, You have reason for to commend that excellent Institution of the Feast of the Family; and indeed we have experience that those Families that are partakers of the Blessings of that Feast do flourish and prosper ever after in an extraordinary manner. But hear me now, and I will tell you what I know. You shall understand that there is not under the Heavens so chaste a Nation as this of *Bensalem*, nor so free from all Pollution or foulness; it is the Virgin of the world. I remember I have read in one of your European Books of an holy Hermit amongst you that desired to see the Spirit of Fornication, and there appeared to him a little foul ugly *Æthiope*: But if he had desired to see the Spirit of Chastity of *Bensalem*, it would have appeared to him in the likeness of a fair beautiful Cherubin; for there is nothing amongst mortal Men more fair and admirable then the chaste Minds of this People. Know therefore that with them there are no Stews, no dissolute Houses, no Curtesans, nor any thing of that kind: nay they wonder (with detestation) at you in Europe which permit such things. They say you have put Marriage out of office: For Marriage is ordained a remedy for unlawful Concupiscence, and Natural Concupiscence seemeth as a spur to Marriage: but when men have at hand a remedy more agreeable to their corrupt will, Marriage is almost expelled. And therefore there are with you seen

infinite

infinite men that marry not, but chuse rather a libertine and impure single life then to be yoked in Marriage; and many that do marry marry late, when the prime and strength of their years is past; and when they do marry, what is Marriage to them but a very Bargain, wherein is sought Alliance, or Portion, or Reputation, with some desire (almost indifferent) of Issue, and not the faithful Nuptial Union of Man and Wife that was first instituted? Neither is it possible that those that have cast away so basely so much of their strength, should greatly esteem Children (being of the same matter) as chaste men do. So likewise during Marriage is the case much amended, as it ought to be if those things were tolerated onely for necessity? No, but they remain still as a very affront to Marriage; the haunting of those dissolute places, or resort to Courtisans; are no more punished in Married men then in Batchelors: And the depraved custom of change, and the delight in Meretricious embracements, (where Sin is turned into Art) maketh Marriage a dull thing, and a kind of Imposition or Tax. They hear you defend these things as done to avoid greater Evils, as Advoutries, Deflouring of Virgins, Unnatural Lust, and the like: but they say this is a preposterous Wisdom; and they call it Lot's offer, who to save his Guests from abusing, offered his Daughters: Nay, they say further, that there is little gained in this, for that the same Vices and Appetites do still remain and abound, Unlawful Lust being like a Furnace, that if you stop the Flames altogether, it will quench, but if you give it any vent, it will rage. As for Masculine Love they have no touch of it; and yet there are not so faithful and inviolate Friendships in the world again as are there: And to speak generally (as I said before) I have not read of any such Chastity in any People as theirs. And their usual saying is, That whosoever is unchaste cannot reverence himself. And they say, That the reverence of a man's self is, next Religion, the chiefeft bridle of all Vices. And when he had said this the good Jew paused a little. Whereupon I far more willing to hear him speak on then to speak my self, yet thinking it decent that upon his pause of speech I should not be altogether silent, said onely this; That I would say to him as the Widow of Sarepta said to Elias, That he was come to bring to memory our sins; and that I confess the Righteousness of Bensalem was greater then the Righteousness of Europe. At which speech he bowed his head, and went on in this manner: They have also many wise and excellent Laws touching Marriage.

They allow no Polygamy. They have ordained that none do intermarry or contract until a month be past from their first Interview. Marriage without consent of Parents they do not make void, but they mulct it in the Inheritors; for the Children of such Marriages are not admitted to inherit above a third part of their Parents Inheritance. I have read in a Book of one of your men of a Feigned Common-wealth, where the Married couple are permitted, before they contract, to see one another naked. This they dislike, for they think it a scorn to give a refusal after so familiar knowledge: but because of many hidden Defects in men and womens bodies, they have a more civil way; for they have near every Town a couple of Pools (which they call Adam and Eve's Pools) where it is permitted to one of the friends of the man, and another of the friends of the woman, to see them severally bath naked.

And as we were thus in conference, there came one that seemed to be a messenger, in a rich Huke, that spake with the Jew; whereupon he turned to me and said, *You will pardon me, for I am commanded away in haste.* The next morning he came to me again, joyful, as it seemed, and said, *There is word come to the Governour of the City that one of the Fathers of Solomon's House will be here this day seven-night; we have seen none of them this dozen years. His coming is in State, but the cause of his coming is secret. I will provide you and your Fellows of a good standing to see his Entry.* I thanked him, and told him, *I was most glad of the news.* The day being come, he made his Entry. He was a Man of middle stature and age, comely of person, and had an aspect as if he pitied men: He was clothed in a Robe of fine black Cloth, with wide Sleeves, and a Cape: his under Garment was of excellent white Linen down to the foot, girt with a Girdle of the same, and a Sindon or Tippet of the same about his neck: he had Gloves that were curious, and set with Stone, and Shoes of Peach-coloured Velvet: his Neck was bare to the shoulders: his Hat was like a Helmet or Spanish Montera, and his Locks curled below it decently, they were of colour brown: his Beard was cut round, and of the same colour with his Hair, somewhat lighter. He was carried in a rich Chariot, without Wheels, Litter-wise, with two Horses at either end, richly trapped in blew Velvet Embroidered, and two Footmen on each side in the like attire. The Chariot was all of Cedar, gilt and adorned with Crystal, save that the fore-end had Pannels

Pannels of Sapphires set in borders of Gold, and the hinder-end the like of Emeralds of the Peru colour. There was also a Sun of Gold, radiant upon the top, in the midst, and on the top before a small Cherub of Gold, with Wings displayed. The Chariot was covered with Cloth of Gold tissued upon blew. He had before him fifty attendants, young men all, in white Satten loose Coats up to the mid-leg, and Stockins of white Silk, and Shoes of blew Velvet, and Hats of blew Velvet, with fine Plumes of divers colours set round like Hatbands. Next before the Chariot went two men bare-headed, in Linen garments down to the foot, girt, and Shoes of blew Velvet, who carried, the one a Crosier, the other a Pastoral-Staff like a Sheep-hook, neither of them of Metall, but the Crosier of Balm-wood, the Pastoral-Staff of Cedar. Horsemen he had none, neither before nor behind his Chariot, as it seemeth, to avoid all tumult and trouble. Behind his Chariot went all the Officers and Principals of the Companies of the City. He sate alone upon Cushions, of a kind of excellent Plush, blew, and under his foot curious Carpets of Silk of divers colours, like the Persian, but far finer. He held up his bare hand as he went, as blessing the People, but in silence. The Street was wonderfully well kept, so that there was never any Army had their men stand in better battel-array then the people stood: The Windows likewise were not crowded, but every one stood in them as if they had been placed. When the Show was past, the Jew said to me, *I shall not be able to attend you as I would, in regard of some Charge the City hath laid upon me for the entertaining of this great Person.* Three days after the Jew came to me again, and said, *Ye are happy men, for the Father of Solomon's House taketh knowledge of your being here, and commanded me to tell you, that he will admit all your Company to his presence, and have private conference with one of you that ye shall chuse; and for this hath appointed the next day after to-morrow. And because he meaneth to give you his Blessing, he hath appointed it in the fore-noon.* We came at our day and hour, and I was chosen by my fellows for the private access. We found him in a fair Chamber richly Hanged, and Carpeted under foot, without any Degrees to the State: he was set upon a low Throne richly adorned, and a rich Cloth of State over his head of blew Satten Embroidered. He was alone, save that he had two Pages of Honour, on either hand one, finely attired in white.

white. His Under-garments were the like that we saw him wear in the Chariot; but instead of his Gown he had on him a Mantle with a Cape of the same fine Black, fastened about him. When we came in, as we were taught, we bowed low at our first entrance; and when we were come near his Chair, he stood up, holding forth his hand ungloved, and in posture of blessing; and we every one of us stooped down and kissed the hem of his Tippet. That done, the rest departed, and I remained. Then he warned the Pages forth of the Room, and caused me to sit down beside him, and spake to me thus in the Spanish Tongue.

G O D bleſſ thee, my Son, I will give thee the greatest Jewel I have; for I will impart unto thee, for the love of G O D and Men, a Relation of the true state of Solomon's House. Son, to make you know the true state of Solomon's House, I will keep this order. First, I will set forth unto you the End of our Foundation; Secondly, the Preparations and Instruments we have for our Works; Thirdly, the several Employments and Functions whereto our Fellows are assigned; And fourthly, the Ordinances and Rites which we observe. The End of our Foundation is the Knowledge of Causes and Secret Motions of things, and the Entarging of the bounds of Humane Empire, to the effecting of all things possible.

The Preparations and Instruments are these. We have large and deep Caves of several Depths: the deepest are sunk 600 fathom, and some of them are digged and made under great Hills and Mountains; so that if you reckon together the depth of the Hill and the depth of the Cave, they are (some of them) above three miles deep: For we find that the depth of an Hill, and the depth of a Cave from the Flat, is the same thing, both remote alike from the Sun and Heaven's Beams, and from the open Air. These Caves we call the Lower Region, and we use them for all Coagulations, Indurations, Refrigerations, and Conservations of Bodies. We use them likewise for the Imitation of Natural Mines, and the producing also of new Artificial Metalls, by Compositions and Materials which we use and lay there for many years. We use them also sometimes (which may seem strange) for Curing of some Diseases, and for Prolongation of Life in some Hermits that chuse to live there, well accommodated of all things necessary, and indeed live very long; by whom also we learn many things. We have Burials in several Earths, where we put divers Ce-
ments

ments, as the Chineses do their Porcellane: but we have them in greater variety, and some of them more fine. We also have great variety of Composts and Soils for the making of the Earth fruitful.

We have high Towers, the highest about half a mile in height, and some of them likewise set upon high Mountains, so that the vantage of the Hill with the Tower is in the highest of them three miles at least. And these places we call the Upper Region, accounting the Air between the High Places and the Low as a Middle Region. We use these Towers, according to their several Heights and Situations, for Insolation, Refrigeration, Conservation, and for the View of divers Meteors, as Winds, Rain, Snow, Hail, and some of the Fiery Meteors also. And upon them, in some places, are dwellings of Hermits, whom we visit sometimes, and instruct what to observe.

We have great Lakes, both salt and fresh, whereof we have use for the Fish and Fowl. We use them also for Burials of some Natural Bodies; for we find a difference in things buried in Earth, or in Air below the Earth, and things buried in Water. We have also Pools, of which some do strain fresh Water out of salt, and others by Art do turn fresh Water into salt. We have also some Rocks in the midst of the Sea, and some Bays upon the Shore for some Works, wherein is required the Air and Vapour of the Sea. We have likewise violent Streams and Cataracts, which serve us for many Motions: And likewise Engines for multiplying and enforcing of Winds, to set also on going divers Motions.

We have also a number of Artificial Wells and Fountains, made in imitation of the Natural Sources and Baths, as tincted upon Vitriol, Sulphur, Steel, Brass, Lead, Nitre, and other Minerals. And again, we have little Wells for Infusions of many things, where the Waters take the Virtue quicker and better then in Vessels or Basins: And amongst them we have a Water which we call Water of Paradise, being by that we doe to it made very sovereign for Health and Prolongation of Life.

We have also great and spacious Houses, where we imitate and demonstrate Meteors, as Snow, Hail, Rain, some Artificial Rains of Bodies, and not of Water, Thunders, Lightnings; also Generations of Bodies in Air, as Frogs, Flies, and divers others.

We have also certain Chambers which we call Chambers of Health, where we qualifie the Air as we think good and proper for the Cure of divers Diseases and Preservation of Health.

We

We have also fair and large Baths, of several Mixtures, for the Cure of Diseases, and the restoring of Mans Body from Arefaction; and other for the Confirming of it in strength of Sinews, Vital Parts, and the very Juice and Substance of the Body.

We have also large and various Orchards and Gardens, wherein we do not so much respect Beauty, as variety of ground and soil, proper for divers Trees and Herbs: and some very spacious, where Trees and Berries are set, whereof we make divers kinds of Drinks, besides the Vine-yards. In these we practise likewise all Conclusions of Grafting and Inoculating, as well of Wild-trees as Fruit-trees, which produceth many Effects. And we make (by Art) in the same Orchards and Gardens, Trees and Flowers to come earlier or later then their Seasons, and to come up and bear more speedily then by their Natural course they do: we make them also (by Art) much greater then their Nature, and their Fruit greater and sweeter, and of differing Taste, Smell, Colour and Figure from their Nature; and many of them we so order that they become of Medicinal use.

We have also means to make divers Plants rise, by mixtures of Earths, without Seeds, and likewise to make divers new Plants differing from the Vulgar, and to make one Tree or Plant turn into another.

We have also Parks and Enclosures of all sorts of Beasts and Birds; which we use not onely for View or Rareness, but likewise for Dissections and Trials, that thereby we may take light what may be wrought upon the Body of Man; wherein we find many strange Effects: as Continuing Life in them, though divers parts, which you account Vital, be perished and taken forth; Resuscitating of some that seem dead in appearance, and the like. We try also all Poisons and other Medicines upon them, as well of Chirurgery as Physick. By Art likewise we make them greater or taller then their kind is, and contrariwise dwarf them and stay their growth: we make them more fruitful and bearing then their kind is, and contrariwise barren and not generative. Also we make them differ in Colour, Shape, Activity, many ways. We find means to make Commixtures and Copulations of divers kinds, which have produced many new kinds, and them not barren, as the general opinion is. We make a number of kinds of Serpents, Worms, Flies, Fishes, of Putrefaction; whereof some are advanced (in effect) to be perfect Creatures, like Beasts or Birds, and have Sexes, and do propagate. Neither doe we this by Chance, but we know beforehand of what matter and commixture what kind of those Creatures will arise.

We have also particular Pools where we make Trials upon Fishes, as we have said before of Beasts and Birds.

We have also Places for Breed and Generation of those Kinds of Worms and Flies which are of special use, such as are with you your Silk-worms and Bees.

I will not hold you long with recounting of our Brew houses, Bake-houses and Kitchens, where are made divers Drinks, Breads and Meats, rare and of special effects. Wines we have of Grapes, and Drinks of other Juice, of Fruits, of Grains and of Roots; and of mixtures with Hony, Sugar, Manna, and Fruits dried and decocted; also of the Tears or Woundings of Trees, and of the Pulp of Canes: And these Drinks are of several Ages, some to the age or last of forty years. We have Drinks also brewed with several Herbs and Roots and Spices, yea with several Fleshes and White-meats; whereof some of the Drinks are such as they are in effect Meat and Drink both, so that divers, especially in Age, do desire to live with them with little or no Meat or Bread. And above all we strive to have Drinks of extreme thin parts, to insinuate into the Body, and yet without all biting, sharpness or fretting; insomuch as some of them put upon the back of your hand will, with a little stay, pass through to the palm, and yet taste mild to the mouth. We have also Waters which we ripen in that fashion as they become nourishing, so that they are indeed excellent Drink; and many will use no other. Breads we have of several Grains, Roots and Kernels; yea and some of Flesh and Fish dried, with divers kinds of Levenings and Seasonings: so that some do extremely move Appetites; some do nourish so as divers do live of them without any other meat, who live very long. So for Meats, we have some of them so beaten and made tender and mortified, yet without all corrupting, as a weak heat of the Stomach will turn them into good Chylus, as well as a strong heat would meat otherwise prepared. We have some Meats also, and Breads and Drinks, which taken by men enable them to fast long after; and some other that used make the very Flesh of men's bodies sensibly more hard and tough, and their Strength far greater then otherwise it would be.

We have Dispensatories or Shops of Medicines, wherein you may easily think, if we have such variety of Plants and Living Creatures more then you have in Europe. (for we know what you have) the Simples, Drugs and Ingredients of Medicines must likewise be in so much the greater variety. We have them likewise

of divers Ages, and long Fermentations. And for their Preparations we have not onely all manner of exquisite Distillations and Separations, and especially by gentle Heats, and Percolations through divers Strainers, yea and Substances; but also exact Forms of Composition, whereby they incorporate almost as they were Natural Simples.

We have also divers Mechanical Arts, which you have not, and Stuffs made by them, as Papers, Linen, Silks, Tissues, dainty works of Feathers of wonderful lustre, excellent Dies, and many others; and Shops likewise as well for such as are not brought into vulgar use amongst us, as for those that are. For you must know, that of the things before recited many are grown into use throughout the Kingdom; but yet, if they did flow from our Invention, we have of them also for Patterns and Principals.

We have also Furnaces of great diversities, and that keep great diversitie of Heats, Fierce and Quick, Strong and Constant, Soft and Mild, Blown, Quiet, Drie, Moist, and the like. But above all we have Heats, in imitation of the Sun's and Heavenly Bodies Heats, that pass divers Inequalities, and (as it were) Orbs, Progresses and Returns, whereby we may produce admirable effects. Besides, we have Heats of Dunges, and of Bellies and Maws of Living Creatures, and of their Blounds and Bodies; and of Hays and Herbs laid up moist; of Lime unquenched, and such like: Instruments also which generate Heat onely by Motion: and further, Places for strong Infusions; and again, Places under the Earth, which by Nature or Art yield Heat. These divers Heats we use, as the nature of the Operation which we intend requireth.

We have also Perspective-Houles where we make Demonstration of all Lights and Radiations, and of all Colours; and out of things uncoloured and transparent, we can represent unto you all several Colours, not in Rain-bows, (as it is in Gems and Prisms) but of themselves single. We represent also all Multiplications of Light, which we carry to great distance, and make so sharp as to discern small Points and Lines: Also all Colourations of Light, all Delusions and Deceits of the Sight, in Figures, Magnitudes, Motions, Colours; all Demonstrations of Shadows. We find also divers means yet unknown to you of producing of Light originally from divers Bodies. We procure means of seeing Objects afar off, as in the Heaven, and remote places; and represent things near as afar off, and things afar off as near, making feigned Distances. We have also Helps for the

the Sight far above Spectacles and Glasses in use. We have also Glasses and means to see small and minute Bodies perfectly and distinctly, as the shapes and colours of small Flies and Worms, grains and flaws in Gems, which cannot otherwise be seen; Observations in Urine and Bloud, not otherwise to be seen. We make Artificial Rainbows, Halo's, and Circles about Light. We represent also all manner of Reflexions, Refractions, and multiplication of Visual Beams of Objects.

We have also Precious Stones of all kinds, many of them of great beauty, and to you unknown; Crystals likewise, and Glasses of divers kinds, and amongst them some of Metalls Vitricated, and other Materials, beside those of which you make Glas: Also a number of Fossiles and imperfect Minerals, which you have not; likewise Loadstones of prodigious virtue, and other rare Stones both Natural and Artificial.

We have also Sound-houses, where we practise and demonstrate all Sounds and their Generation. We have Harmonies which you have not, of Quarter-sounds, and lesser Slides of Sounds; divers Instruments of Musick likewise to you unknown, some sweeter then any you have; with Bells and Rings that are dainty and sweet. We represent small Sounds as great and deep, likewise great Sounds extenuate and sharp. We make divers tremblings and warblings of Sounds, which in their original are entire: We represent and imitate all articulate Sounds and Letters, and the Voices and Notes of Beasts and Birds. We have certain Helps, which set to the Ear do further the Hearing greatly: We have also divers strange and artificial Echo's reflecting the Voice many times, and as it were tossing it; and some that give back the Voice louder then it came, some shriller, and some deeper, yea some rendring the Voice differing in the Letters or articulate Sound from that they receive. We have all means to convey Sounds in Trunks and Pipes in strange lines and distances.

We have also Perfume-houses, wherewith we joyn also practices of Taste: we multiply Smells, which may seem strange; we imitate Smells, making all Smells to breath out of other mixtures then those that give them. We make divers imitations of Taste likewise, so that they will deceive any man's taste. And in this House we contain also a Confiture-house, where we make all Sweet-meats drie and moist, and divers pleasant Wines, Milks, Broths and Sallets, far in greater Variety then you have.

We have also Engine-houses, where are prepared Engines and

Instruments for all sorts of motions. There we imitate and practise to make swifter motions then any you have, either out of your Muskets or any Engine that you have; and to make them and multiply them more easily, and with small force, by wheels and other means; and to make them stronger and more violent then yours are, exceeding your greatest Cannons and Basilisks. We represent also Ordnance and Instruments of War, and Engines of all kinds, and likewise new mixtures and compositions of Gunpowder, Wild-fires burning in Water and unquenchable; also Fire-works of all variety, both for pleasure and use. We imitate also flights of Birds: we have some degrees of flying in the Air: we have Ships and Boats for going under water, and brooking of Seas; also Swimming-girdles and Supporters. We have divers curious Clocks, and other like motions of Return, and some Perpetual motions. We imitate also motions of Living Creatures by Images of Men, Beasts, Birds, Fishes and Serpents: we have also a great number of other various motions, strange for quality, fineness and subtilty.

We have also a Mathematical House, where are represented all Instruments, as well of Geometry as Astronomy, exquisitely made.

We have also Houses of Deceits of the Senses, where we represent all manner of feats of Jugling, false Apparitions, Impostures and Illusions, and their Fallacies. And surely you will easily believe that we that have so many things truly Natural, which induce admiration, could in a world of particulars deceive the Senses, if we would disguise those things, and labour to make them more miraculous: But we do hate all Impostures and Lies, insomuch as we have severely forbidden it to all our Fellows under pain of Ignominy and Fines, that they do not shew any Natural work or thing adorned or swelling, but onely pure as it is, and without all affectation of Strangeness.

These are (my Son) the Riches of Solomon's House.

For the severall Employments and Offices of our Fellows; we have twelve that sail into Forein Countries under the names of other Nations, (for our own we conceal) who bring us the Books, and Abstracts, and Patterns of Experiments of all other Parts. These we call Merchants of Light.

We have three that collect the Experiments which are in all Books. These we call Depredators.

We have three that collect the Experiments of all Mechanical

cal Arts, and also of Liberal Sciences, and also of Practices which are not brought into Arts. These we call Mystery-men.

We have three that trie new Experiments, such as themselves think good. These we call Pioneers or Miners.

We have three that draw the Experiments of the former four into Titles and Tables, to give the better lights for the drawing of Observations and Axioms out of them. These we call Compilers.

We have three that bend themselves, looking into the Experiments of their Fellows, and cast about how to draw out of them things of use and practice for man's Life and Knowledge, as well for Works as for plain Demonstration of Causes, means of Natural Divinations, and the easie and clear discovery of the Virtues and Parts of Bodies. These we call Dowry-men or Benefactors.

Then after divers Meetings and Consults of our whole Number, to consider of the former Labours and Collections, we have three that take care out of them to direct new Experiments of a higher Light, more penetrating into Nature then the former. These we call Lamps.

We have three others that do execute the Experiment so directed, and report them. These we call Inoculators.

Lastly, we have three that raise the former Discoveries by Experiments into greater Observations, Axioms and Aphorisms. These we call Interpreters of Nature.

We have also, as you must think, Novices and Apprentices, that the Succession of the former employed men do not fail; besides a great number of Servants and Attendants, Men and Women. And this we doe also, We have Consultations which of the Inventions and Experiences which we have discovered shall be published, and which not; and take all an Oath of Secrecy for the concealing of those which we think meet to keep secret: though some of those we do reveal sometime to the State, and some not.

For our Ordinances and Rites; we have two very long and fair Galleries: In one of these we place Patterns and Samples of all manner of the more rare and excellent Inventions; in the other we place the Statues of all principal Inventors. There we have the Statue of your Columbus, that discovered the West-Indies; also the Inventour of Ships; your Monk that was the Inventour of Ordnance and of Gun-powder; the Inventour of Musick; the Inventor of Letters; the Inventor of Printing; the Inventor of Observations of Astronomy; the Inventor of Works

Works in Metall; the Inventour of Glasse; the Inventour of Silk of the Worm; the Inventour of Wine; the Inventour of Corn and Bread; the Inventour of Sugars: And all these by more certain Tradition then you have. Then we have divers Inventours of our own of excellent Works, which since you have not seen, it were too long to make Descriptions of them; and besides, in the right understanding of those Descriptions you might easily erre. For upon every Invention of value we erect a Statue to the Inventour, and give him a liberal and honourable Reward. These Statues are some of Brasse, some of Marble and Touch-stone, some of Cedar and other special Woods gilt and adorned, some of Iron, some of Silver, some of Gold.

We have certain Hymns and Services which we say daily, of Laud and Thanks to God for his marvellous Works; and Forms of Prayers imploring his aid and blessing for the Illumination of our Labours, and the turning them into good and holy uses.

Lastly, we have Circuits or Visits of divers principal Cities of the Kingdome, where, as it cometh to pass, we do publish such new profitable Inventions as we think good. And we do also declare Natural Divinations of Diseases, Plagues, Swarms of hurtful Creatures, Scarcity, Tempest, Earth-quakes, great Inundations, Comets, Temperature of the Year, and divers other things: and we give Counsel thereupon what the People shall doe for the prevention and remedy of them.

And when he had said this he stood up: and I, as I had been taught, kneeled down; and he laid his Right hand upon my head and said, GOD blest thee, my Son, and GOD blest this Relation which I have made: I give thee leave to publish it for the good of other Nations; for we here are in GOD's Bosome, a Land unknown. And so he left me, having assigned a value of about two thousand Ducats for a Bounty to me and my Fellows; for they give great Largeesses where they come upon all occasions.

The rest was not perfected.



MAGNALIA NATURÆ
PRÆCIPUE QUOAD USUS
HUMANOS.



HE Prolongation of Life.

The Restitution of Youth in some degree.

The Retardation of Age.

The Curing of Diseases counted Incurable.

The Mitigation of Pain.

More Easie and less Loathsome Purgings.

The Encreasing of Strength and Activity.

The Encreasing of Ability to suffer Torture or Pain.

The Altering of Complexions, and Fatness and Leanness.

The Altering of Statures.

The Altering of Features.

The Encreasing and Exalting of the Intellectual Parts.

Version of Bodies into other Bodies.

Making of new Species.

Transplanting of one Species into another.

Instruments of Destruction, as of War and Poison.

Exhilaration of the Spirits, and putting them in good Disposition.

Force

Force of the Imagination, either upon another Body, or upon the Body it self.

Acceleration of Time in Maturations.

Acceleration of Time in Clarifications.

Acceleration of Putrefaction.

Acceleration of Decoction.

Acceleration of Germination.

Making Rich Composts for the Earth.

Impressions of the Air, and raising of Tempests.

Great Alteration, as in Induration, Emollition, &c.

Turning Crude and VVatry Substances into Oily and Unctuous Substances.

Drawing of new Foods out of Substances not now in use.

Making new Threds for Apparel, and new Stuffs, such as are Paper, Glass, &c.

Natural Divinations.

Deceptions of the Senses.

Greater Pleasures of the Senses.

Artificial Minerals and Cements.

FINIS.

HISTORY
NATURAL
AND *LE. 24, 25*
EXPERIMENTAL
OF
Life and Death;
OR,
Of the Prolongation of Life.

Written in Latine by the Right Honourable
FRANCIS Lord *Verulam*, Viscount *St. Albans*.



LONDON,
Printed for *William Lee* at the *Turk's Head*
in *Fleet-street*. 1664.

HISTORY NATURAL

EXPERIMENTAL

Life and Death;

Of the Prolongation of Life.

Written in Latin by the Right Honourable
FRANCIS LORD MONTAGU, Viscount of Albemarle.



LONDON,
Printed for William Lee at the Turk's Head
in Fleet-Street. 1684.



TO THE READER.



Am to give Advertisement, that there came forth of late a *Translation* of this *Book* by an unknown PERSON, who though he wished well to the propagating of his *Lordship's Works*, yet he was altogether unacquainted with his *Lordship's Style* and *manner of Expressions*, and so published a *Translation* lame and defective in the whole. Whereupon I thought fit to recommend the same to be translated anew by a more *diligent* and *zealous Pen*, which hath since travelled in it; and though it still comes short of that lively and incomparable Spirit and Expression which lived and died with the *Author*, yet I dare avouch it to be much more warrantable and agreeable then the former. It is true, this *Book* was not intended to have been published in *English*; but seeing it hath been already made free of that *Language*, whatsoever benefit or delight may redound from it, I commend the same to the courteous and judicious Reader.

W. R.



To the present Age and Posterity,
Greeting.



Although I had ranked the History of Life and Death as the last amongst my six Monthly Designations; yet I have thought fit, in respect of the prime use thereof, (in which the least loss of time ought to be esteemed precious) to invert that Order, and to send it forth in the second place. For I have hope, and wish, that it may conduce to a common good; and that the nobler sort of Physicians will advance their thoughts, and not employ their times wholly in the sordidness of Cures, neither be Honoured for Necessity onely, but that they will become Coadjutors and Instruments of the Divine Omnipotence and Clemency in Prolonging and Renewing the Life of Man; especially seeing I prescribe it to be done by Safe, and Convenient, and Civil ways, though hitherto un-assayed. For though we Christians do continually aspire and pant after the Land of Promise, yet it will be a token of God's favour towards us, in our journeyings through this World's Wilderness, to have our Shoes and Garments (I mean those of our frail Bodies) little worn or impaired.

FR. St. ALBANS.



THE HISTORY OF Life and Death.

The Preface.

IT is an ancient saying and complaint, That *Life* is *short* and *Art* long; wherefore it behoveth us, who make it our chiefest aim to perfect *Arts*, to take upon us the consideration of *Prolonging Man's Life*, *God*, the Author of all *Truth* and *Life*, prospering our Endeavours. For though the *Life* of *Man* be nothing else but a mass and accumulation of sins and sorrows, and they that look for an *Eternal* life set but light by a *Temporary*: yet the continuation of works of *Charity* ought not to be condemned, even by us *Christians*. Besides, the *beloved Disciple* of our Lord survived the other *Disciples*; and many of the *Fathers* of the *Church*, especially of the holy *Monks* and *Hermits*, were long-lived: which shews, that this blessing of *Long life*, so often promised in the old *Law*, had less abatement after our *Saviour's* days then other earthly blessings had; but to esteem of this as the chiefest good we are but too prone. Onely the Enquirie is difficult how to attain the same; and so much the rather, because it is corrupted with false opinions and vain reports: for both those things which the *vulgar Physicians* talk of, *Radical Moisture* and *Natural Heat*, are but mere *Fictions*; and the immoderate

The Preface.

rate praises of *Chymical Medicines*, first puff up with vain hopes, and then fail their admirers.

And as for that *Death* which is caused by Suffocation, Putrefaction, and several Diseases, we speak not of it now, for that pertains to an *History of Physick*; but onely of that *Death* which comes by a total decay of the Body, and the Inconcoction of old Age. Nevertheless the last act of *Death*, and the very extinguishing of *Life* it self, which may so many ways be wrought outwardly and inwardly (which notwithstanding have, as it were, one common Porch before it comes to the point of death) will be pertinent to be inquired of in this Treatise; but we reserve that for the last place.

That which may be repaired by degrees, without a total waste of the first stock, is potentially eternal, as the *Vestal Fire*. Therefore when *Physicians* and *Philosophers* saw that living Creatures were nourished and their Bodies repaired, but that this did last onely for a time, and afterwards came old age, and in the end dissolution; they sought *Death* in somewhat which could not properly be repaired, supposing a *Radical Moisture* incapable of solid reparation, and which, from the first infancy, received a spurious addition, but no true reparation, whereby it grew daily worse and worse, and, in the end, brought the Bad to None at all. This conceit of theirs was both ignorant and vain: for all things in living creatures are in their youth repaired entirely; nay, they are for a time increased in Quantity, bettered in Quality, so as the Matter of reparation might be eternal, if the Manner of reparation did not fail. But this is the truth of it, There is in the declining of age an unequal Reparation; some parts are repaired easily, others with difficulty and to their loss; so as from that time the bodies of men begin to endure the torments of *Mezentius*, *That the Living die in the Embraces of the Dead*; and the parts easily reparable, through their conjunction with the parts hardly reparable, do decay: for the *Spirits, Blood, Flesh and Fat* are, even after the decline of years, easily repaired; but the drier and more porous parts (as the *Membranes*, all the *Tunicles*, the *Sinews*, *Arteries*, *Veins*, *Bones*, *Cartilages*, most of the *Bowels*, in a word, almost all the *Organical parts*) are hardly reparable, and to their loss. Now these hardly-reparable parts, when they come to their office of repairing the other which are easily reparable, finding themselves deprived of their wonted ability and strength, cease to perform any longer their proper functions: By which means it comes to pass, that in process of time the whole tends to dissolution; and even those very parts which in their own nature are with much ease reparable, yet through the decay of the Organs of reparation can no more receive reparation, but decline, and in the end utterly fail. And the cause of the Termination of Life is this, for that the *Spirits*, like a gentle flame, continually preying upon Bodies, conspiring with the outward *Air*, which is ever sucking and drying of them, do, in time, destroy the whole Fabrick of the Body, as also the particular Engines and Organs thereof, and make them unable for the work of reparation. These are the true ways of *Natural Death*, well and faithfully to be revolved in our minds; for he that knows not the ways of *Nature*, how can he succour her, or turn her about?

Therefore the *Inquisition* ought to be two-fold; the one touching the *Consumption* or *Depredation* of the Body of Man; the other touching the *Reparation* and *Renovation* of the same: to the end that the former may,

The Preface.

as much as is possible, be forbidden and restrained, and the latter comforted. The former of these pertains especially to the *Spirits* and outward *Air*, by which the *Depredation* and *Waste* is committed; the latter to the whole race of *Alimentation* or Nourishment, whereby the Renovation or Restitution is made. And as for the former part touching *Consumption*, this hath many things common with *Bodies Inanimate*, or without life. For such things as the *Native Spirit* (which is in all tangible Bodies, whether living or without life) and the ambient or external *Air* worketh upon *Bodies inanimate*, the same it attempteth upon *Animate* or *Living Bodies*; although the *Vital Spirit* superadded doth partly break and bridle those operations, partly exalt and advance them wonderfully. For it is most manifest that *Inanimate Bodies* (most of them) will endure a long time without any *Reparation*; but *Bodies Animate* without Food and *Reparation* suddenly fall and are extinguished, as the *Fire* is. So then, our *Inquisition* shall be double. First, we will consider the *Body of Man* as *Inanimate*, and not repaired by *Nourishment*: Secondly, as *Animate*, and repaired by *Nourishment*. Thus having Prefac'd these things, we come now to the *Topick* places of *Inquisition*.

THE

315



THE PARTICULAR

Topick Places ;

O R,

Articles of Inquisition touching Life and Death.

First, inquire of *Nature durable* and *Not durable*, in Bodies *Inanimate* or without life, as also in *Vegetables*; but that not in a large or just Treatise, but as in a Brief or Summary onely.

Also inquire diligently of *Desiccation*, *Arefaction*, and *Consumption* of Bodies *Inanimate*, and of *Vegetables*; and of the ways and processes by which they are done: and further of *Inhibiting* and *Delaying* of *Desiccation*, *Arefaction*, and *Consumption*; and of the *Conservation* of Bodies in their proper state: and again, of the *Inteneration*, *Emolliation*, and *Recovery* of Bodies to their former freshness, after they be once dried and withered.

Neither need the Inquisition touching these things to be full or exact; seeing they pertain rather to their proper Title of Nature Durable; seeing also they are not Principals in this Inquisition, but serve onely to give light to the Prolongation and Instauration of Life in living Creatures. In which (as was said before) the same things come to pass, but in a particular manner. So from the Inquisition touching Bodies Inanimate and Vegetables, let the Inquisition pass on to other living Creatures besides Man.

Inquire touching the *Length* and *Shortness* of *Life* in *living Creatures*, with the due Circumstances which make most for their long or short lives.

But because the *Duration* of *Bodies* is two-fold, one in *Identity*, or the self-same substance, the other by a *Renovation* or *Reparation*; whereof the former hath place onely in bodies *Inanimate*, the latter in *Vegetables* and *living Creatures*, and is perfected by *Alimentation* or *Nourishment*: therefore it will be fit to inquire of *Alimentation*, and of the ways and progresses thereof; yet this not exactly, (because it pertains properly to the titles of *Assimilation* and *Alimentation*) but, as the rest, in progress onely.

From the Inquisition touching living Creatures, and Bodies repaired by Nourishment, pass on to the Inquisition touching Man. And now being come to the principal subject of Inquisition, the Inquisition ought to be in all points more precise and accurate.

Inquire touching the *Length* and *Shortness* of *Life* in *Men* according to the *Ages* of the *World*, the several *Regions*, *Climates*, and *Places* of their *Nativity* and *Habitation*.

Inquire touching the *Length* and *Shortness* of *Life* in *Men* according to their *Races* and *Families*, as if it were a thing hereditary; also according to their *Complexions*, *Constitutions*, and *Habits* of body, their *Statures*, the *manner* and *time* of their *Growth*, and the *making* and *composition* of their *Members*.

Inquire touching the *Length* and *Shortness* of *Life* in *Men* according to the *time* of their *Nativity*, but so far as you omit for the present all *Astrological* observations, and the *Figures* of *Heaven* under which they were born: onely insist upon the vulgar and manifest observations, as whether they were born in the *Seventh*, *Eighth*, *Ninth*, or *Tenth* Month, also whether by *Night* or by *Day*, and in what *Month* of the *Year*.

8

Inquire touching the *Length* and *Shortness* of *Life* in *men* according to their *Fare*, *Diet*, *Government* of their *life*, *Exercises*, and the like. For as for the *Air* in which men live and make their abode, we account that proper to be inquired of in the above-said *Article*, touching the *places* of their *Habitation*.

9

Inquire touching the *Length* and *Shortness* of *Life* in *men* according to their *Studies*, their several *Courses* of *life*, the *Affections* of the *mind*, and divers *Accidents* befalling them.

10

Inquire apart touching those *Medicines* which are thought to prolong *life*.

11

Inquire touching the *Signs* and *Prognosticks* of long and short *life*; not those which betoken *death* at hand, (for they belong to an *History* of *Physick*) but those which are seen and may be observed even in *health*, whether they be *Physiognomical* signs, or any other.

Hitherto have been propounded Inquisitions touching Length and Shortness of Life, besides the Rules of Art, and in a confused manner; now we think to add some which shall be more Art-like, and tending to practice, under the name of Intentions. Those Intentions are generally three: As for the particular Distributions of them, we will propound them when we come to the Inquisition it self. The three general Intentions are, the Forbidding of Waste and Consumption, the Perfecting of Reparation, and the Renewing of Oldness.

12

Inquire touching those things which *conserve* and *exempt* the *Body* of *man* from *Arefaction* and *Consumption*, at least which put off and protract the inclination thereunto.

13

Inquire touching those things which pertain to the whole process of *Alimentation*, (by which the *Body* of *man* is repaired) that it may be good, and with the best improvement.

14

Inquire touching those things which *purge* out the *old Matter*, and *supply* with *new*, as also which do *Intenerate* and *Moisten* those parts which are already dried and hardned.

But because it will be hard to know the Waies of Death, unless we search out and discover the Seat, or House, or rather Den of Death, it will be convenient to make Inquisition of this thing; yet not of every kind of Death, but of those Deaths which are caused by want and indigence of Nourishment, not by violence; for they are those Deaths onely which pertain to a decay of Nature and mere Old Age.

15

Inquire touching the point of *Death*, and the *porches* of *Death* leading thereunto from all parts, so as that *Death* be caused by a decay of *Nature*, and not by violence.

Lastly, because it is behoveful to know the Character and Form of Old Age, which will then best be done if you make a Collection of all the Differences, both in the State and Functions of the Body, betwixt Youth and Old Age, that by them you may observe what it is that produceth such manifold Effects; let not this Inquisition be omitted.

16

Inquire diligently touching the differences in the state of the *Body* and *Faculties* of the *Mind* in *Youth* and *Old Age*; and whether there be any that remain the same without alteration or abatement in *Old Age*.

17



Nature Durable and Not Durable.

The History.

To the first
Article.

1



Metals are of that long lasting, that men cannot trace the beginnings of them; and when they do decay, they decay through *rust*, not through perspiration into *Air*: yet *Gold* decays neither way.

2

Quick-silver, though it be an humid and fluid body, and easily made volatile by *Fire*, yet (as far as we have observed) by *Age* alone, without *Fire*, it neither wasteth nor gathereth *rust*.

3

Stones, especially the harder sort of them, and many other *Fossiles*, are of long lasting.

ing, and that though they be exposed to the open air ; much more if they be buried in the earth. Notwithstanding *Stones* gather a kind of *Nitre*, which is to them in stead of *Rust*. *Precious Stones* and *Crystals* exceed *Metalls* in long lasting ; but then they grow dimmer and less Orient, if they be very old.

It is observed, that *Stones* lying towards the North do sooner decay with age then those that lie toward the South ; and that appears manifestly in *Pyramids*, and *Churches*, and other ancient *Buildings* : contrariwise, in *Iron*, that exposed to the South gathers *Rust* sooner, and that to the North later ; as may be seen in the *Iron-bars* of windows. And no marvel, seeing in all putrefaction (as *Rust* is) Moisture hastens Dissolutions ; in all simple Arefaction, Driness.

In *Vegetables*, (we speak of such as are fell'd, not growing) the Stocks or Bodies of harder *Trees*, and the Timber made of them, last divers ages. But then there is difference in the bodies of *Trees* : some *Trees* are in a manner spongie, as the *Elder*, in which the pith in the midst is soft, and the outward part harder ; but in Timber-trees, as the *Oak*, the inner part (which they call *Heart of Oak*) lasteth longer.

The *Leaves*, and *Flowers*, and *Stalks* of *Plants* are but of short lasting, but dissolve into dust, unless they putrefie : the *Roots* are more durable.

The *Bones* of living Creatures last long, as we may see it of mens bones in Charnel-houses : *Horns* also last very long ; so do *Teeth*, as it is seen in *Ivory*, and the *Sea-horse* Teeth.

Hides also and *Skins* endure very long, as is evident in old *Parchment-books* : *Paper* likewise will last many ages, though not so long as *Parchment*.

Such things as have passed the *Fire* last long, as *Glass* and *Bricks* ; likewise *Flesh* and *Fruits* that have passed the *Fire* last longer then *Raw* : and that not onely because the Baking in the *Fire* forbids putrefaction ; but also because the watry humor being drawn forth, the oily humor supports it self the longer.

Water of all *Liquors* is soonest drunk up by *Air*, contrariwise *Oil* lasteth ; which we may see not onely in the *Liquors* themselves, but in the *Liquors* mixt with other Bodies : for *Paper* wet with water, and so getting some degree of transparency, will soon after wax white, and lose the transparency again, the watry vapour exhaling ; but oiled *Paper* will keep the transparency long, the *Oil* not being apt to exhale : And therefore they that counterfeit mens hands, will lay the oiled paper upon the writing they mean to counterfeit, and then assay to draw the lines.

Gums all of them last very long ; the like do *Wax* and *Honey*.

But the equal or unequal use of things conduceth no less to long lasting or short lasting, then the things themselves ; for *Timber*, and *Stones*, and other *Bodies*, standing continually in the *water*, or continually in the *air*, last longer then if they were sometimes wet, sometimes drie : and so *Stones* continue longer, if they be laid towards the same coast of Heaven in the Building that they lay in the Mine. The same is of *Plants* removed, if they be coasted just as they were before.

Observations.

Let this be laid for a Foundation, which is most sure, That there is no *moving* Tangible body a Spirit, or body Pneumatical, enclosed and covered with these tangible parts ; And that from this Spirit is the beginning of all Dissolution and Consumption, so as the Antidote against them is the detaining of this Spirit.

This Spirit is detained two ways : either by a straight Inclosure, as it were in a Prison ; or by a kind of free and voluntary Detention. Again, this voluntary stay is perswaded two ways : either if the Spirit is selfe not too moveable or eager to depart ; or if the external Air importune it not too much to come forth. So then, two sorts of Substances are durable, Hard Substances, and Oily : Hard Substance binds in the Spirits close ; Oily partly enticeth the Spirit to stay, partly is of that nature that it is not importuned by Air ; for Air is consubstantial to Water, and Flame to Oil. And touching Nature Durable and Not Durable in Bodies Inanimate, thus much.

The History.

Herbs of the colder sort die yearly both in Root and Stalk ; as *Lettice*, *Purslane* ; also *Wheat* and all kind of *Corn* : yet there are some cold Herbs which will last three

three or four years; as the *Violet*, *Straw-berry*, *Burnet*, *Prim-rose*, and *Sorrel*. But *Borage* and *Bugloss*, which seem so alike when they are alive, differ in their deaths; for *Borage* will last but one year, *Bugloss* will last more.

But many hot Herbs bear their age and years better; *Hyssop*, *Thyme*, *Savorie*, *Pot-marjoram*, *Balm*, *Worm-wood*, *Germander*, *Sage*, and the like. *Fennel* dies yearly in the stalk, buds again from the root: but *Pulse* and *Sweet-marjoram* can better endure age than winter; for being set in a very warm place and well fenced, they will live more than one year. It is known, that a knot of *Hyssop* twice a year thorn hath continued forty years.

Bushes and *Shrubs* live threescore years, and some double as much. A *Vine* may attain to threescore years, and continue fruitful in the old age. *Rose-mary* well placed will come also to threescore years, but *white Thorn* and *Ivie* endure above an hundred years. As for the *Bramble*, the age thereof is not certainly known, because bowing the head to the ground it gets new roots, so as you cannot distinguish the old from the new.

Amongst great *Trees* the longest livers are the *Oke*, the *Holm*, the *Wild-ash*, the *Elm*, the *Beech-tree*, the *Chest-nut*, the *Plane-tree*, *Ficus Ruminalis*, the *Lote-tree*, the *Wild-Olive*, the *Palm-tree* and the *Mulberry-tree*. Of these, some have come to the age of eight hundred years; but the least livers of them do attain to two hundred.

But *Trees Odorate*, or that have sweet woods, and *Trees Rozennie*, last longer in their Woods or Timber than those above-said, but they are not so long-liv'd, as the *Cypress-tree*, *Maple*, *Pine*, *Box*, *Juniper*. The *Cedar* being born out by the vastness of his body, lives well-near as long as the former.

The *Ash*, fertile and forward in bearing, reacheth to an hundred years and somewhat better; which also the *Birch*, *Maple* and *Service-tree* sometimes doe: but the *Poplar*, *Lime-tree*, *Willow*, and that which they call the *Sycamore*, and *Walnut-tree*, live not so long.

The *Apple-tree*, *Pear-tree*, *Plum-tree*, *Pomegranate-tree*, *Citron-tree*, *Medlar-tree*, *Black-cherry-tree*, *Cherry-tree*, may attain to fifty or sixty years; especially if they be cleansed from the Moss wherewith some of them are clothed.

Generally, greatness of body in trees, if other things be equal, hath some congruity with length of life; so hath hardness of substance: and trees bearing Mast or Nuts are commonly longer livers than trees bearing Fruit or Berries: likewise trees putting forth their leaves late, and shedding them late again, live longer than those that are early either in leaves or fruit: the like is of *Wild-trees* in comparison of *Orchard-trees*: And lastly, in the same kind, trees that bear a sower fruit out-live those that bear a sweet fruit.

An Observation.

Aristotle noted well the difference between Plants and living Creatures, in respect of their Nourishment and Reparation: Namely, that the bodies of living Creatures are confined within certain bounds, and that after they be come to their full growth they are continued and preserved by Nourishment, but they put forth nothing new except Hair and Nails, which are counted for no better then Excrements; so as the juice of living creatures must of necessity sooner wax old: but in Trees, which put forth yearly new boughs, new shoots, new leaves, and new fruits, it cometh to pass that all these parts in Trees are once a year young and renewed. Now it being so, that whatsoever is fresh and young draws the Nourishment more lively and chearfully to it then that which is decayed and old, it happens withall, that the stock and body of the tree, through which the sap passeth to the branches, is refreshed and cleared with a more bountiful and vigorous nourishment in the passage then otherwise it would have been. And this appears manifest (though Aristotle noted it not, neither hath he expressed these things so clearly and perspicuously) in Hedges, Copses, and Pollards, when the plashing, shedding, or lopping comforteth the old stem or stock, and maketh it more flourishing and longer liv'd.

The History of Life and Death.

5

Desiccation. Prohibiting of Desiccation, and In-teneration of that which is desiccated and dried.

The History.

To the 2^d Article.

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Fire and strong Heats dry some things, and melt others.

Limus ut hic durefcit, & hac ut Cera liquefcit, Uno eodemque Igne?

How this Clay is hardened, and how this Wax is melted, with one and the same thing, Fire? It drieth Earth, Stones, Wood, Closh, and Skins, and whatsoever is not liquefiable; and it melteth Metalls, Wax, Gums, Butter, Tallow, and the like.

Notwithstanding, even in those things which the fire melteth, if it be very vehement and continueth, it doth at last dry them. For metall in a strong fire, (Gold onely excepted) the volatile part being gone forth, will become less ponderous and more brittle; and those oily and fat substances in the like fire will burn up, and be dried and parched.

Air, especially open Air, doth manifestly dry, but not melt: as High-ways, and the upper part of the Earth, moistned with showers, are dried; linen cloaths washed, if they be hang'd out in the air, are likewise dried; herbs, and leaves, and flowers, laid forth in the shade, are dried. But much more suddenly doth the Air this, if it be either enlightned with the Sun-beams, (so that they cause not putrefaction) or if the air be stirred, as when the wind bloweth, or in rooms open on all sides.

Age most of all, but yet slowest of all, drieth, as in all bodies which (if they be not prevented by putrefaction) are drie with Age. But age is nothing of it self, being onely the measure of time; that which causeth the effect is the native Spirit of bodies, which sucketh up the moisture of the body, and then, together with it, flieth forth; and the air ambient, which multiplieth it self upon the native spirits and juices of the body, and preyeth upon them.

Cold of all things most properly drieth: for drying is not caused but by Contraction; now contraction is the proper work of cold. But because we Men have heat in a high degree, namely, that of Fire, but cold in a very low degree, no other then that of Winter, or perhaps of Ice, or of Snow, or of Nitre; therefore the drying caused by cold is but weak, and easily resolved. Notwithstanding we see the surface of the earth to be more dried by Frost, or by March-winds, then by the Sun, seeing the same wind both licketh up the moisture and affecteth with coldness.

Smook is a drier, as in Bacon and Neats tongues which are hanged up in chimneys: & Perfumes of Olibanum, or Lignum Aloes, and the like, drie the Brain, and cure Catarrhs.

Salt, after some reasonable continuance, drieth, not onely on the out-side, but in the inside also; as in Flesh and Fish salted, which if they have continued any long time have a manifest hardness within.

Hot Gums applied to the skin drie and wrinkle it; and some astringent waters also doe the same.

Spirit of strong Wines imitateth the fire in drying; for it will both porch an Egg put into it, and roast Bread.

Powders drie like Sponges by drinking up the moisture; as it is in Sand thrown upon Lines new written: also smoothness and polireness of bodies (which suffer not the vapour of moisture to go in by the pores) drie by accident, because it exposeth it to the air; as it is seen in precious Stones, Looking-glasses, and Blades of Swords, upon which if you breath, you shall see at first a little mist; but Soon after it vanisheth like a cloud. And thus much for Desiccation or Drying.

They use at this day in the East parts of Germany Garners in Vauls under ground, wherein they keep Wheat and other grains, laying a good quantity of straw both under the grains and about them, to save them from the dankness of the Vauls; by which device they keep their grains 20 or 30 years. And this doth not onely preserve them from rustiness, but (that which pertains more to the present Inquisition) preserves them also in that greenness that they are fit and serviceable to make bread. The same is reported to have been in use in Cappadocia and Thracia, and some parts of Spain.

The placing of Garners on the tops of houses, with windows towards the East and North, is very commodious. Some also make two Sollars, an upper and a lower; and the upper Sollar hath an hole it, through which the grain continually descendeth, like sand in an hour-glass, and after a few days they throw it up again with shovels, that so it may be in continual motion. Now it is to be noted that

that this doth not onely prevent the Fustiness, but conserveth the Greenness, and slacketh the Desiccation of it. The Cause is that which we noted before, That the dischargeing of the *Watry humor*, which is quickned by the *Motion* and the *Winds*, preserves the *Oily humor* in his being, which otherwise would flie out together with the *Watry humor*. Also in some Mountains, where the *Air* is very pure, *dead Carcases* may be kept for a good while without any great decay.

13 *Fruits*, as *Pomegranates*, *Citrons*, *Apples*, *Pears*, and the like; also *Flowers*, as *Roses* and *Lilies*, may be kept a long time in Earthen Vessels close stopp'd: howsoever, they are not free from the injuries of the outward *Air*, which will affect them with his unequal Temper through the sides of the Vessel, as it is manifest in heat and cold. Therefore it will be good to stop the mouths of the Vessels carefully, and to bury them within the *Earth*; and it will be as good not to bury them in the *Earth*, but to sink them in the *Water*, so as the place be shady, as in *Wells* or *Cisterns* placed within doors: but those that be sunk in *Water* will do better in Glass vessels then in Earthen.

14 Generally those things which are kept in the *Earth*, or in *Vaults* under ground, or in the bottom of a *Well*, will preserve their freshness longer then those things that are kept above ground.

15 They say it hath been observed, that in *Conservatories* of *Snow* (whether they were in Mountains, in natural Pits, or in Wells made by Art for that purpose) an *Apple*, or *Chestnut*, or *Nut*, by chance falling in, after many months, when the *Snow* hath melted, hath been found in the *Snow* as fresh and fair as if it had been gathered the day before.

16 Country people keep *Clusters* of *Grapes* in *Meal*, which though it makes them less pleasant to the taste, yet it preserves their moisture and freshness. Also the harder sort of *Fruits* may be kept long, not onely in *Meal*, but also in *Saw-dust*, and in *heaps* of *Corn*.

17 There is an opinion held, that *Bodies* may be preserved fresh in *Liquors* of their own kind, as in their proper *Menstrua*, as, to keep *Grapes* in *Wine*, *Olives* in *Oil*.

18 *Pomegranates* and *Quinces* are kept long, being lightly dipped in *Sea-water* or *Salt-water*, and soon after taken out again, and then dried in the open *Air*, so it be in the Shade.

19 *Bodies* put in *Wine*, *Oil*, or the *Lees* of *Oil*, keep long; much more in *Hony* or *Spirit of Wine*; but most of all, as some say, in *Quick-silver*.

20 *Fruits* inclosed in *Wax*, *Pitch*, *Plaster*, *Paste*, or any the like Case or Covering, keep green very long.

21 It is manifest that *Flies*, *Spiders*, *Ants*, or the like small *Creatures*, falling by chance into *Amber* or the *Gums* of *Trees*, and so finding a burial in them, do never after corrupt or rot, although they be soft and tender *Bodies*.

22 *Grapes* are kept long by being hanged up in *Bunches*: the same is of other *Fruits*. For there is a two-fold Commodity of this thing: the one, that they are kept without pressing or bruising, which they must needs suffer if they were laid upon any hard substance; the other, that the *Air* doth encompass them on every side alike.

23 It is observed that *Putrefaction*, no less then *Desiccation*, in *Vegetables*, doth not begin in every part alike, but chiefly in that part where, being alive, it did attract nourishment. Therefore some advise to cover the stalks of *Apples* or other *Fruits* with *Wax* or *Pitch*.

24 Great *Wicks* of *Candles* or *Lamps* do sooner consume the *Tallow* or *Oil* then lesser *Wicks*; also *Wicks* of *Cotten* sooner then those of *Rush*, or *Straw*, or small *Twigs*: and in *Staves* of *Torches*, those of *Juniper* or *Firre* sooner then those of *Ash*: likewise *Flame* moved and fanned with the *Wind* sooner then that which is still: And therefore *Candles* set in a *Lamborn* will last longer then in the open *Air*. There is a Tradition, that *Lamps* set in *Sepulchres* will last an incredible time.

25 The *Nature* also and *Preparation* of the *Nourishment* conduceth no less to the lasting of *Lamps* and *Candles*, then the nature of the *Flame*; for *Wax* will last longer then *Tallow*, and *Tallow* a little wet longer, then *Tallow* drie, and *Wax-candles* old made longer then *Wax-candles* new made.

26 *Trees*, if you stir the *Earth* about their *Roots* every year, will continue less time; if once in four, or perhaps in ten years, much longer: also cutting off the *Suckers* and young *Shoots* will make them live the longer: but *Dunging* them, or laying of *Manure* about their *Roots*, or much *Watering* them, adds to their fertility, but cuts off from their long lasting. And thus much touching the *Prohibiting* of *Desiccation* or *Consumption*.

The *Inteneration* or making tender of that which is *dried* (which is the chief Matter) affords but a small number of *Experiments*. And therefore some few *Experiments* which are found in *living creatures* and also in *Man* shall be joyned together.

Bands of Willow, wherewith they use to bind *Trees*, laid in water grow more flexible: likewise they put *boughs of Birch* (the ends of them) in earthen pots filled with water, to keep them from *withering*; and *Bowls* cleft with driness, steep'd in water, close again.

Boots grown hard and obstinate with age, by greasing them before the fire with *Tallow*, wax soft, or being onely held before the fire get some softness. *Bladders* and *Parchments* hardned also become tender with warm water, mixed with *Tallow* or any fat thing, but much the better if they be a little *chafed*.

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A strict *emaciating diet* of *Guaicum*, *Bisket*, and the like, (wherewith they use to cure the *French-pox*, old *Catarrhs*, and some kind of *Dropsies*) doth first bring men to great poverty and leanness, by waisting the juices and humors of the Body; which after they begin to be repaired again, seem manifestly more vigorous and young. Nay, and I am of opinion, that *emaciating Diseases* afterwards well cured, have advanced many in the way of long life.

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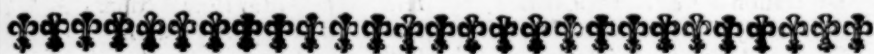
The second *Action*, which is the *Issuing forth* or *Flight* of the *Spirit*, is as manifest also. For that issuing forth, when it is in throngs, is apparent even to the sense; in Vapours to the sight, in Odours to the smelling: but if it issueth forth slowly, (as when a thing is decayed by age) then it is not apparent to the sense, but the matter is the same. Again, where the composition of the body is either so straight or so tenuous, that the *Spirit* can find no pores or passages by which to depart, then, in the striving to get out, it drives before it the grosser parts of the body, and protrudes them beyond the superficies or surface of the body; as it is in the rust of *Metalls*, and mould of all fat things. And this is the second *Action*, the *Issuing forth* or *Flight* of the *Spirit*.

The third *Action* is somewhat more obscure, but full as certain; that is, the *Contraction* of the grosser parts after the *Spirit* issued forth. And this appears, first, in that Bodies after the *Spirit* issued forth do manifestly shrink, and fill a less room; as it is in the

the kernels of Nuts, which after they are dried are too little for the shells; and in Beams and planchers of Houses, which at first lay close together, but after they are dried give; and likewise in Bowls, which through drought grow full of cranies, the parts of the Bowl contracting themselves together, and after contraction must needs be empty spaces. Secondly, it appears by the wrinkles of Bodies dried: for the endeavour of contracting it self is such, that by the contraction it brings the parts nearer together, and so lifts them up; for whatsoever is contracted on the sides is lifted up in the midst: and this is to be seen in Papers and old Parchments, and in the Skins of living Creatures, and in the Coats of soft Cheeses, all which with age gather wrinkles. Thirdly, this Contraction seems it self most in those things which by heat are not only wrinkled, but ruffled, and plighted, and, as it were, rouled together; as it is in Papers, and Parchments, and Leaves brought near the fire: for contraction by age, which is more slow, commonly causeth wrinkles; but contraction by the fire, which is more speedy, causeth plighting. Now in most things where it comes not to wrinkling or plighting, there is simple contraction, and angustiation or straightning, and induration or haraning, and delication, as was shewed in the first place: But if the issuing forth of the Spirit, and absumption or waste of the Moisture be so great, that there is not left body sufficient to unite and contract it self, then of necessity contraction must cease, and the Body become putrid, and nothing else but a little dust cleaving together, which with a light touch is dispersed and falleth asunder; as it is in Bodies that are rotten, and in paper burnt, and linen made into tinder, and carcases embalmed after many ages. And this is the third Action, the Contraction of the grosser parts after the Spirit issueth forth.

It is to be noted, that Fire and Heat drie onely by accident; for their proper work is to attenuate and dilate the Spirit and Moisture: and then it follows by accident, that the other parts should contract themselves, either for the flying of Vacuum alone, or for some other motion withall, whereof we now speak not.

It is certain, that Putrefaction taketh its original from the native Spirit no less then Arefaction; but it goeth on a far different way: for in Putrefaction the Spirit is not simply vapoured forth, but being detained in part works strange garboils, and the grosser parts are not so much locally contracted as they congregate themselves to parts of the same nature.



Length and Shortness of Life in Living Creatures.

The History.

To the first Article.

Touching the Length and Shortness of Life in living Creatures, the Information which may be had is but slender, Observation is negligent, and Tradition fabulous: in Tame Creatures their degenerate life corrupteth them; in Wild Creatures their exposing to all weathers often intercepteth them. Neither do those things which may seem Concomitants give any furtherance to this Information, (the greatness of their bodies, their time of bearing in the womb, the number of their young ones, the time of their growth, and the rest) in regard that these things are intermixed, and sometimes they concur, sometimes they sever.

Man's age (as far as can be gathered by any certain Narration) doth exceed the age of all other living Creatures, except it be of a very few onely: and the Concomitants in him are very equally disposed, his Stature and proportion large, his bearing in the womb nine months, his Fruit commonly one at a birth, his Puberty at the age of fourteen years, his time of growing till twenty.

The Elephant by undoubted relation exceeds the ordinary race of Man's life: but his bearing in the womb the space of ten years is fabulous; of two years, or at least above one, is certain. Now his bulk is great, his time of growth until the thirtieth year, his teeth exceeding hard; neither hath it been observed that his blood is the coldest of all creatures: his age hath sometimes reached to two hundred years.

Lions are accounted long livers, because many of them have been found Toothless, a sign not so certain, for that may be caused by their strong breath.

The Bear is a great sleeper, a dull beast and given to ease; and yet not noted for

for long life : nay, he hath this sign of short life, that his *bearing* in the *womb* is but short, scarce full forty days.

The *Fox* seems to be well disposed in many things for long life ; he is well skinned, feeds on flesh, lives in Dens ; and yet he is noted not to have that property. Certainly he is a kind of *Dog*, and that kind is but short-liv'd.

The *Camel* is a long liver, a lean Creature, and sinewy, so that he doth ordinarily attain to fifty, and sometimes to an hundred years.

The *Horse* lives but to a moderate age, scarce to forty years, his ordinary period is twenty years ; but perhaps he is beholden for this shortness of life to *Man* ; for we have now no *Horses* of the *Sun*, that live freely, and at pleasure, in good pastures. Notwithstanding the *Horse* grows till he be six years old, and is able for generation in his old age. Besides, the *Mare* goeth longer with her young-one then a *Woman*, and brings forth two at a burthen more rarely. The *Ass* lives commonly to the *Horse's* age ; but the *Mule* out-lives them both.

The *Hart* is famous amongst men for long life, yet not upon any relation that is undoubted. They tell of a certain *Hart* that was found with a Collar about his neck, and that Collar hidden with *Fat*. The long life of the *Hart* is the less credible ; because he comes to his perfection at the fifth year ; and not long after his *Horns* (*which he sheds and renews yearly) grow more narrow at the Root, and less branched.

The *Dog* is but a short liver, he exceeds not the age of twenty years, and for the most part lives not to fourteen years : a Creature of the hottest temper, and living in extremes, for he is commonly either in vehement motion, or sleeping : besides, the *Bitch* bringeth forth many at a burthen, and goeth nine weeks.

The *Ox* likewise, for the greatness of his body and strength, is but a short liver, about some sixteen years, and the *Males* live longer then the *Females* ; notwithstanding they bear usually but one at a burthen, and go nine months : a Creature dull, fleshy, and soon fatted, and living onely upon Herby substances, without Grain.

The *Sheep* seldom lives to ten years, though he be a creature of a moderate size, and excellently clad ; and, that which may seem a wonder, being a creature with so little a Gall, yet he hath the most curled Coat of any other ; for the *Hair* of no Creature is so much curled as *Wool* is. The *Rams* generate not before the third year, and continue able for generation until the eighth. The *Ewe* bear young as long as they live. The *Sheep* is a diseased Creature, and rarely lives to his full age.

The *Goat* lives to the same age with the *Sheep*, and is not much unlike in other things, though he be a Creature more nimble, and of somewhat a firmer flesh, and so should be longer-liv'd ; but then he is much more lascivious, and that shortens his life.

The *Sow* lives to fifteen years, sometimes to twenty : and though it be a Creature of the moistest flesh, yet that seems to make nothing to Length of Life. Of the *Wild Boar* or *Sau* we have nothing certain.

The *Cat's* age is betwixt six and ten years ; a creature nimble and full of spirit, whose seed (as *Ælian* reports) burneth the Female ; whereupon it is said, That the *Cat* conceives with pain, and brings forth with ease : A Creature ravenous in eating, rather swallowing down his meat whole then feeding.

Hares and *Conies* attain scarce to seven years, being both Creatures generative, and with young-ones of several conceptions in their bellies. In this they are unlike, that the *Coney* lives under ground, and the *Hare* above ground ; and again, that the *Hare* is of a more dastardish flesh.

Birds for the size of their bodies are much lesser then *Beasts* ; for an *Eagle* or *Swan* is but a small thing in comparison of an *Ox* or *Horse* ; and so is an *Asp* to an *Elephant*.

Birds are excellently well clad ; for *Plumage* ; for warmth and close sitting to the body, exceed *Wool* and *Hairs*.

Birds, though they hatch many young-ones together, yet they bear them not all in their bodies at once, but lay their Eggs by themselves, whereby their Fruit hath the more plentiful nourishment whilst it is in their bodies.

Birds chew little or nothing, but their meat is found whole in their crops ; notwithstanding they will break the shells of Fruits, and pick out the Kernels : they are thought to be of a very hot and strong concoction.

The motion of *Birds* in their flying is a mixt motion, consisting of a moving of the limbs, and of a kind of carriage; which is a most wholesome kind of Exercise.

Aristotle noted well touching the generation of *Birds*, (but he transferred it ill to other living Creatures) that the seed of the *Male* confers less to generation than the *Female*, but that it rather affords Activity then Matter; so that fruitful *Eggs* and unfruitful *Eggs* are hardly distinguished.

Birds (almost all of them) come to their full growth the first year, or a little after. It is true, that their Feathers in some kinds, and their Bills in others, shew their years, but for the growth of their Bodies it is not so.

The *Eagle* is accounted a long liver, yet his years are not set down; and it is alleged as a sign of his long life, that he casts his Bill, whereby he grows young again: from whence comes that Proverb, *The old age of an Eagle*. Notwithstanding perchance the matter may be thus, That the renewing of the *Eagle* doth not cast his bill, but the casting of his bill is the renewing of the *Eagle*; for after that his bill is grown to a great crookedness, the *Eagle* feeds with much difficulty.

Vultures also are affirmed to be long livers, inasmuch that they extend their life well-near to an hundred years. *Kites* likewise, and so all *Birds* that feed upon flesh, and *Birds* of prey live long. As for *Hawks*, because they lead a degenerate and servile life for the delight of men, the term of their natural life is not certainly known: notwithstanding amongst *Mewed Hawks* some have been found to have lived thirty years, and amongst *Wild Hawks* forty years.

The *Raven* likewise is reported to live long, sometimes to an hundred years: he feeds on Carrion, and flies not often, but rather is a sedentary and melancholick Bird, and hath very black flesh. But the *Crow*, like unto him in most things, (except in greatness and voice) lives not altogether so long, and yet is reckoned amongst the long livers.

The *Swan* is certainly found to be a long liver, and exceeds not unfrequently an hundred years. He is a Bird excellently plumed, a feeder upon fish, and is always carried, and that in running waters.

The *Goose* also may pass amongst the long livers, though his food be commonly grass, and such kind of nourishment: especially the *Wild-Goose*; whereupon this Proverb grew amongst the *Germans*, *Magis senex quam Anser nivalis*, Older then a *Wild-Goose*.

Storks must needs be long livers, if that be true which was anciently observed of them, that they never came to *Thebes*, because that City was often sacked. This if it were so, then either they must have the knowledge of more ages then one, or else the old ones must tell their young the History. But there is nothing more frequent then *Fables*.

For *Fables* do so abound touching the *Phoenix*, that the truth is utterly lost if any such Bird there be. As for that which was so much admired, That she was ever seen abroad with a great troop of *Birds* about her, it is no such wonder; for the same is usually seen about an *Owl* flying in the day-time, or a *Parrot* let out of a Cage.

The *Parrot* hath been certainly known to have lived threescore years in *England*, how old soever he was before he was brought over: a Bird eating almost all kind of meats, chewing his meat, and renewing his bill, likewise curst and mischievous, and of a black flesh.

The *Peacock* lives twenty years; but he comes not forth with his *Argus-Eyes* before he be three years old: a Bird slow of pace, having whitish flesh.

The *Dunghil-Cock* is voracious, martial, and but of a short life; a crank Bird, having also white flesh.

The *Indian-Cock*, commonly called the *Turkey-Cock*, lives not much longer then the *Dunghil-cock*: an angry Bird, and hath exceeding white flesh.

The *Ring-Doves* are of the longest sort of livers, inasmuch that they attain sometimes to fifty years of age: an airy Bird, and both builds and sits on high. But *Doves* and *Turtles* are but short-liv'd, not exceeding eight years.

But *Pheasants* and *Partridges* may live to sixteen years. They are great breeders, but not so white of flesh as the ordinary *Pheasant*.

The *Black-bird* is reported to be, amongst the lesser birds, one of the longest livers; an unhappy bird, and a good singer. 36

The *Sparrow* is noted to be of a very short life; and it is imputed in the Males to their lasciviousness. But the *Linnet*, no bigger in body than the *Sparrow*, hath been observed to have lived twenty years. 37

Of the *Estrich* we have nothing certain; those that were kept here have been so unfortunate, that no long life appeared by them. Of the bird *Ibis* we find onely that he liveth long, but his years are not recorded. 38

The age of *Fishes* is more uncertain than that of terrestrial Creatures, because living under the water they are the less observed: many of them breath not, by which means their vital Spirit is more closed in; and therefore, though they receive some refrigeration by their Gills, yet that refrigeration is not so continual as when it is by breathing. 39

They are free from the *Desiccation* and *Depredation* of the *Air ambient*, because they live in the water: yet there is no doubt but the *Water ambient*, and piercing, and received into the pores of their body, doth more hurt to long life than the *Air* doth. 40

It is affirmed too that their blood is not warm. Some of them are great devourers, even of their own kind. Their flesh is softer and more tender than that of terrestrial creatures: they grow exceedingly fat, insomuch that an incredible quantity of Oil will be extracted out of one *Whale*. 41

Dolphins are reported to live about thirty years; of which thing a trial was taken in some of them by cutting off their tails: they grow until ten years of age. 42

That which they report of some *Fishes* is strange, that after a certain age their bodies will waste and grow very slender, onely their head and tail retaining their former greatness. 43

There were found in *Casar's* Fish-ponds *Lampreys* to have lived threescore years: they were grown so familiar with long use, that *Crassus* the Orator solemnly lamented one of them. 44

The *Pike* amongst *Fishes* living in fresh water is found to last longest, sometimes to forty years: he is a Ravener, of a flesh somewhat dry and firm. 45

But the *Carp*, *Bream*, *Tench*, *Eel*, and the like, are not held to live above ten years. 46

Salmons are quick of growth, short of life, so are *Trouts*: but the *Perch* is slow of growth, long of life. 47

Touching that monstrous bulk of the *Whale* or *Ork*, how long it is weiled by vital spirit, we have received nothing certain, neither yet touching the *Sea-calf*, and *Sea-bog*, and other innumerable *Fishes*. 48

Crocodiles are reported to be exceeding long-liv'd, and are famous for the time of their growth, for that they, amongst all other Creatures, are thought to grow during their whole life. They are of those Creatures that lay Eggs, ravenous, cruel, and well-fenced against the waters. Touching the other kinds of *Shell-fish*, we find nothing certain how long they live. 49

Observations.

To find out a Rule touching Length and Shortness of Life in Living Creatures is very difficult, by reason of the negligence of Observations, and the intermixing of Causes. A few things we will set down.

There are more kinds of Birds found to be long-liv'd than of Beasts; as the Eagle, the Vulture, the Kite, the Pelican, the Raven, the Crow, the Swan, the Goose, the Stork, the Crane, the Bird called the Ibis, the Parrot, the Ring-dove, with the rest, though they come to their full growth within a year, and are less of bodies: surely their cloathing is excellent good against the distemperatures of the weather; and besides, living for the most part in the open Air, they are like the Inhabitants of pure Mountains, which are long-liv'd. Again, their Motion, which (as I else-where said) is a mixt Motion, compounded of a moving of their Limbs and of a carriage in the Air, doth less weary and wear them, and is more wholesome. Neither do they suffer any compression or want of nourishment in their mother's bellies, because the Eggs are laid by turns. But the chiefest cause of all I take to be this, that Birds are made more of the substance of the 1

Mother then of the Father, whereby their Spirits are not so eager and hot.

It may be a Position, that Creatures which partake more of the substance of their Mother than of their Father are longer-liv'd, as Birds are; which was said before. Also that those which have a longer time of bearing in the womb, do partake more of the substance of the Mother, less of the Father, and so are longer-liv'd: Inasmuch that I am of opinion, that even amongst Men, (which I have noted in some) those that resemble their Mothers most are longest-liv'd; and so are the children of Old men begotten upon young Wives, if the Fathers be sound, not diseased.

The first Breeding of Creatures is ever most material, either to their hurt or benefit. And therefore it stands with reason, that the lesser Compression, and the more liberal Alimentation of the Young one in the womb, should confer much to Long Life. Now this happens when either the young ones are brought forth successively, as in Birds; or when they are single Births, as in Creatures bearing but one at a Burthen.

But long Bearing in the Womb makes for Length of Life three ways. First, for that the young one partakes more of the substance of the Mother, as hath been said. Secondly, that it comes forth more strong and able. Thirdly, that it undergoes the predatory force of the Air later. Besides, it shews that Nature intendeth to finish her periods by larger Circles. Now though Oxen and Sheep, which are born in the womb about six months, are but short-liv'd, that happens for other causes.

Feeders upon Grass and mere Herbs are but short livers; and Creatures feeding upon Flesh, or Seeds, or Fruits, long livers, as some Birds are. As for Harts, which are long-liv'd, they take the one half of their meat (as men use to say) from above their heads; and the Goose, besides Grass, findeth something in the water, and Stubble to feed upon.

We suppose that a good Clothing of the Body maketh much to long life; for it fenceth and armeth against the intemperances of the Air, which do wonderfully assail and decay the body: which benefit Birds especially have. Now that Sheep, which have so good Fleeces, should be so short-liv'd, that is to be imputed to Diseases, whereof that Creature is full, and to the bare eating of Grass.

The seat of the Spirits, without doubt, is principally the Head; which though it be usually understood of the Animal Spirits onely, yet this is all in all. Again, it is not to be doubted but the Spirits do most of all waste and prey upon the Body, so that when they are either in greater plenty, or in greater Inflammation and Acrimony, there the life is much shortned. And therefore I conceive a great cause of long life in Birds to be, the smalness of their Heads in comparison of their Bodies; for even Men which have very great Heads I suppose to be the shorter livers.

I am of opinion that Carriage is of all other motions the most helpful to long life; which I also noted before. Now there are carried Water-fowls upon the water, as Swans; all Birds in their flying, but with a strong endeavour of their limbs; and Fishes, of the length of whose life we have no certainty.

Those Creatures which are long before they come to their perfection (not speaking of growth in stature onely, but of other steps to maturity; as Man puts forth, first, his Teeth, next the signs of Puberty, then his Beard, and so forward) are long-liv'd, for it shews that Nature finisheth her Periods by larger Circles.

Milder Creatures are not long-liv'd, as the Sheep and Dove; for Choler is as the Whetstone and Spur to many Functions in the Body.

Creatures whose Flesh is more dusky are longer-liv'd than those that have white Flesh; for it sheweth that the juice of the Body is more firm, and less apt to dissipate.

In every corruptible Body Quantity maketh much to the conservation of the whole: for a great Fire is longer in quenching, a small portion of Water is sooner evaporated; the Body of a Tree withereth not so fast as a Twig. And therefore generally (I speak it of Species, not of Individuals) Creatures that are large in Body are longer-liv'd than those that are small, unless there be some other potent cause to hinder it.

Alimentation, or Nourishment : and the way of Nourishing.

The History.

To the fourth
Article.

Nourishment ought to be of an inferiour nature, and more simple substance then the thing nourished. *Plants* are nourished with the Earth and Water, *Living Creatures* with Plants, *Man* with Living Creatures. There are also certain *Creatures* feeding upon Flesh, and *Man* himself takes Plants into a part of his Nourishment; but *Man* and *Creatures* feeding upon Flesh are scarcely nourished with Plants alone: perhaps *Fruit* or *Grains*, baked or boiled, may, with long use, nourish them; but *Leaves* of *Plants* or *Herbs* will not doe it, as the *Order* of the *Foliatanes* shewed by Experience.

Over-great *Affinity* or *Consubstantiality* of the *Nourishment* to the thing nourished proveth not well: *Creatures* feeding upon *Herbs* touch no *Flesh*; and of *Creatures* feeding upon *Flesh*, few of them eat their own kind: As for *Men*, which are *Cannibals*, they feed not ordinarily upon *Mens* *Flesh*, but reserve it as a Dainty, either to serve their revenge upon their enemies, or to satisfie their appetite at some times. So the *Ground* is best sown with *Seed* growing else-where, and *Men* do not use to *Graft* or *Inculcate* upon the same *Stock*.

By how much the more the *Nourishment* is better prepared, and approacheth nearer in likeness to the thing nourished, by so much the more are *Plants* more fruitful, and *living Creatures* in better liking and plight: for a young *Slip* or *Cion* is not so well nourished if it be pricked into the ground, as if it be grafted into a *Stock* agreeing with it in Nature, and where it finds the nourishment already digested and prepared: neither (as is reported) will the *Seed* of an *Onion*, or some such like, sown in the bare earth, bring forth so large a fruit as if it be put into another *Onion*, which is a new kind of *Grafting*, into the root, or under ground. Again, it hath been found out lately, that a *Slip* of a *Wild-tree*, as of an *Elm*, *Oak*, *Ash*, or such like, grafted into a *Stock* of the same kind, will bring forth larger leaves then those that grow without grafting: Also *Men* are not nourished so well with raw flesh as with that which hath passed the fire.

Living Creatures are nourished by the *Mouth*, *Plants* by the *Root*, *Young ones* in the womb by the *Navel*: *Birds* for a while are nourished with the *Tolk* in the *Egg*, whereof some is found in their *Crops* after they are hatched.

All *Nourishment* moveth from the *Centre* to the *Circumference*, or from the Inward to the Outward: yet it is to be noted, that in *Trees* and *Plants* the *Nourishment* passeth rather by the *Bark* and Outward parts then by the *Pith* and Inward parts; for if the *Bark* be pilled off, though but for a small breadth round, they live no more: and the *Bloud* in the *Veins* of living *Creatures* doth no less nourish the *Flesh* beneath it then the *Flesh* above it.

In all *Alimentation* or *Nourishment* there is a two-fold Action, *Extusion* and *Attraction*; whereof the former proceeds from the Inward Function, the latter from the Outward.

Vegetables assimilate their *Nourishment* simply, without Excerning: For *Gums* and *Tears* of *Trees* are rather Exuberances then Excrements, and *Knots* or *Knobs* are nothing but *Diseases*. But the substance of living *Creatures* is more perceptible of the like, and therefore it is conjoynd with a kind of disdain, whereby it rejecteth the bad, and assimilareth the good.

It is a strange thing of the *stalks* of *Fruits*, that all the *Nourishment* which produceth sometimes such great *Fruits*, should be forced to pass through so narrow necks; for the *Fruit* is never joyn'd to the *Stock* without some stalk.

It is to be noted, that the *Seeds* of living *Creatures* will not be fruitful but when they are new shed, but the *Seeds* of *Plants* will be fruitful a long time after they are gathered: yet the *Slips* or *Cions* of *Trees* will not grow unless they be grafted green; neither will the roots keep long fresh unless they be covered with earth.

In living *Creatures* there are degrees of *Nourishment* according to their Age: in the womb, the young one is nourished with the Mother's bloud; when it is new-born, with *Milk*; afterwards with *Meats* and *Drinks*; and in old age the most nourishing and savoury *Meats* please best.

Above all it maketh to the present *Inquisition*, to inquire diligently and attentively whether a man may not receive *Nourishment* from without, at least some other way beside the Mouth. We know that Baths of Milk are used in some *Hellick Fevers*, and when the body is brought extreme low; and *Physicians* do provide *Nourishing Clysters*. This matter would be well studied; for if *Nourishment* may be made either from without, or some other way then by the stomach, then the weakness of Concoction, which is incident to old men, might be recompensed by these helps, and Concoction restored to them intire.



Length and Shortness of Life in Man.

The History.

To the 5, 6,
7, 8, 9, and
11 Articles.



Before the *Flood*, as the *Sacred Scriptures* relate, *Men* lived many hundred years; yet none of the *Fathers* attained to a full thousand. Neither was this *Length of Life* peculiar onely to *Grace*, or the *Holy Line*; for there are reckoned of the *Fathers* until the *Flood* eleven Generations, but of the sons of *Adam* by *Cain* onely eight Generations; so as the posterity of *Cain* may seem the longer-liv'd. But this *Length of Life* immediately after the *Flood* was reduced to a moiety, but in the *Post-nati*; for *Noah*, who was born before, equalled the age of his Ancestors, and *Sem* saw the six hundredth year of his life. Afterwards, three Generations being run from the *Flood*, the *Life of Man* was brought down to a fourth part of the primitive *Age*, that was, to about two hundred years.

2 *Abraham* lived an hundred seventy and five years: a man of an high courage, and prosperous in all things. *Isaac* came to an hundred and eighty years of age: a chaste man, and enjoying more quietness then his father. But *Jacob*, after many crosses and a numerous progeny, lasted to the hundred forty seventh year of his life: a patient, gentle, and wise man. *Ishmael*, a military man, lived an hundred thirty and seven years. *Sarah* (whose years onely amongst women are recorded) died in the hundred twenty seventh year of her age: a beautiful and magnanimous woman; a singular good Mother and Wife; and yet no less famous for her Liberty then Obsequiousness towards her husband. *Joseph* also, a prudent and politick man, passing his youth in affliction, afterwards advanced to the height of honour and prosperity, lived an hundred and ten years. But his brother *Levi*, elder then himself, attained to an hundred thirty seven years: a man impatient of contumely and revengeful. Near unto the same age attained the son of *Levi*; also his grand-child, the father of *Aaron* and *Moses*.

3 *Moses* lived an hundred and twenty years: a stout man, and yet the meekest upon the earth, and of a very slow tongue. Howsoever *Moses* in his *Psalm* pronounceth that the life of man is but seventy years, and if a man have strength, then eighty; which term of man's life standeth firm in many particulars even at this day. *Aaron*, who was three years the elder, died the same year with his Brother: a man of a readier speech, of a more facile disposition, and less constant. But *Phineas*, grand-child of *Aaron*, (perhaps out of extraordinary grace) may be collected to have lived three hundred years; if so be the War of the *Israelites* against the Tribe of *Benjamin* (in which Expedition *Phineas* was consulted with) were performed in the same order of time in which the *History* hath ranked it: He was a man of a most eminent Zeal. *Joshua*, a martial man, and an excellent Leader, and evermore victorious, lived to the hundred and tenth year of his life. *Caleb* was his Contemporary, and seemeth to have been of as great years. *Ehud* the Judge, seems to have been no less then an hundred years old, in regard that after the Victory over the *Moabites* the *Holy Land* had rest under his Government eighty years: He was a man fierce and undaunted, and one that in a sort neglected his life for the good of his People.

4 *Job* lived, after the restauration of his happiness, an hundred and forty years, being before his afflictions of that age that he had sons at man's estate: a man politick,

litick, eloquent, charitable, and the *Example of Patience*. *Eli* the Priest lived ninety eight years: a corpulent man, calm of disposition, and indulgent to his children. But *Elizans* the Prophet may seem to have died when he was above an hundred years old; for he is found to have lived after the *assumption* of *Elias* sixty years; and at the time of that *assumption* he was of those years, that the boys mocked him by the name of *Bald-head*: a man vehement and severe, and of an austere life, and a contemner of riches. Also *Isaiah* the Prophet seemeth to have been an hundred years old; for he is found to have exercised the Function of a Prophet seventy years together, the years both of his beginning to prophesie and of his death being uncertain: a man of an admirable eloquence, an *Evangelical Prophet*, full of the promises of God of the *New Testament*, as a Bottle with sweet Wine.

Tobias the elder lived an hundred fifty eight years, the younger, an hundred twenty seven: merciful men, and great alms-givers. It seems, in the time of the *Captivity*, many of the *Jews* who returned out of *Babylon* were of great years, seeing they could remember both *Temples*, (there being no less then seventy years betwixt them) and wept for the unlikeness of them. Many ages after that, in the time of our Saviour, lived old *Simoen*, to the age of ninety years; a devout man, and full both of hope and expectation. Into the same time also fell *Anna* the Prophetess, who could not possibly be less then an hundred years old; for she had been seven years a wife, about eighty four years a widow, besides the years of her virginity, and the time that she lived after her Prophecy of our Saviour: She was an holy woman, and passed her days in fastings and prayers.

The long Lives of Men mentioned in *Heathen Authors* have no great certainty in them; both for the intermixture of Fables, whereunto those kind of relations were very prone, and for their false calculation of years. Certainly of the *Egyptians* we find nothing of moment in those works that are extant as touching long Life, for their Kings which reigned longest did not exceed fifty or five and fifty years, which is no great matter, seeing many at this day attain to those years. But the *Aradian Kings* are fabulously reported to have lived very long. Surely that Countrey was Mountainous, full of flocks of Sheep, and brought forth most wholesome food; notwithstanding, seeing *Pan* was their god, we may conceive that all things about them were *Panick* and vain, and subject to fables.

Numa King of the *Romans* lived to eighty years: a man peaceable, contemplative, and much devoted to Religion. *Marcus Valerius Corvinus* saw an hundred years complete, there being betwixt his first and sixth *Consulship* forty six years: a man valorous, affable, popular, and always fortunate.

Solon of *Athens*, the Law-giver, and one of the seven *Wise-men*, lived above eighty years: a man of an high courage, but popular, and affected to his Country; also learned, given to pleasures and a soft kind of life. *Epimenides* the *Cretian* is reported to have lived an hundred fifty seven years: the matter is mixed with a prodigious relation; for fifty seven of those years he is said to have slept in a Cave. Half an age after *Xenophon* the *Colophonian* lived an hundred and two years, or rather more: for at the age of twenty five years he left his Country, seventy seven complete years he travelled, and after that returned; but how long he lived after his return appears not: a man no less wandering in mind then in body, for his name was changed for the madness of his opinions from *Xenophanes* to *Xenomanes*: a man no doubt of a vast conceit, and that minded nothing but *Infinities*.

Anacreon the Poet lived eighty years and somewhat better: a man lascivious, voluptuous, and given to drink. *Pindarus* the *Theban* lived to eighty years: a Poet of an high fancy, singular in his conceits, and a great adorer of the gods. *Sophocles* the *Athenian* attained to the like age: a lofty Tragick Poet, given over wholly to Writing, and neglectful of his Family.

Artaxerxes King of *Persia* lived ninety four years: a man of a dull wit, averse to the dispatch of business, desirous of glory, but rather of ease. At the same time lived *Agesilaus* King of *Sparta* to eighty four years of age: a moderate Prince, as being a Philosopher among Kings, but notwithstanding ambitious, and a Warrior, and no less stout in war then in business.

Gorgias the *Sicilian* was an hundred and eight years old, a Rhetorician, and a great boaster of his faculty, one that taught Youth for profit: he had seen many Countries.

Countries, and a little before his death said, That he had done nothing worthy of blame since he was an old man. *Protagoras* of *Abdera* saw ninety years of age: this man was likewise a *Rhetorician*, but professed not so much to teach the Liberal Arts, as the Art of Governing Common-wealths and States: notwithstanding he was a great wanderer in the world, no less then *Gorgias*. *Isocrates* the *Athenian* lived ninety eight years: he was a *Rhetorician* also, but an exceeding modest man; one that shunned the publick light, and opened his School onely in his own house. *Democritus* of *Abdera* reached to an hundred and nine years: he was a great *Philosopher*, and, if ever any man amongst the *Grecians*, a true *Naturalist*; a Surveyor of many Countries, but much more of Nature; also a diligent searcher into Experiments, and (as *Aristotle* objected against him) one that followed Similitudes more then the Laws of Arguments. *Diogenes* the *Sinopean* lived ninety years: a man that used liberty towards others, but tyranny over himself; of a course diet, and of much patience. *Zeno* of *Citium* lacked but two years of an hundred: a man of an high mind, and a contemner of other mens opinions; also of a great acuteness, but yet not troublesome, chusing rather to take mens minds then to enforce them: The like whereof afterward was in *Seneca*. *Plato* the *Athenian* attained to eighty one years: a man of a great courage, but yet a lover of ease, in his Notions sublimed, and of a fancy; neat and delicate in his life, rather calm then merry, and one that carried a kind of Majesty in his countenance. *Theophrastus* the *Eressian* arrived at eighty five years of age: a man sweet for his eloquence, sweet for the variety of his matters, and who selected the pleasant things of Philosophy, and let the bitter and harsh goe. *Carnades* of *Cyrene* many years after came to the like age of eighty five years: a man of a fluent eloquence, and one who by the acceptable and pleasant variety of his knowledge delighted both himself and others. But *Orbilinus*, who lived in *Cicero's* time, no *Philosopher* or *Rhetorician*, but a *Grammarians*, attained to an hundred years of age: he was first a Souldier, then a Schoolmaster; a man by nature tart both in his Tongue and Pen, and severe towards his Scholars.

12 *Quintus Fabius Maximus* was *Augur* fixty three years, which shewed him to be above eighty years of age at his death; though it be true, that in the *Anguship* Nobility was more respected then age: a wise man, and a great *Deliberator*, and in all his proceedings moderate, and not without affability severe. *Masinissa* King of *Namidia* lived ninety years, and being more then eighty five got a son: a daring man, and trusting upon his fortune; who in his youth had tasted of the inconstancy of Fortune, but in his succeeding age was constantly happy. But *Marcus Porcius Cato* lived above ninety years of age: a man of an Iron body and mind; he had a bitter tongue, and loved to cherish factions; he was given to Husbandry, and was to himself and his family a Physician.

13 *Terentia*, *Cicero's* wife, lived an hundred and three years: a woman afflicted with many crosses; first, with the banishment of her Husband; then with the difference betwixt them; lastly, with his last fatal misfortune: She was also oftentimes vexed with the *Gout*. *Luccia* must needs exceed an hundred by many years; for it is said that she acted an whole hundred years upon the Stage, at first perhaps representing the person of some young Girl, at last of some decrepit old Woman. But *Galeria Copiola*, a Player also and a Dancer, was brought upon the Stage as a Novice, in what year of her age is not known; but ninety nine years after, at the Dedication of the Theatre by *Pompey the Great*, she was shewn upon the Stage, not now for an Actress, but for a Wonder: neither was this all, for after that in the *Solemnities* for the health and life of *Augustus*, she was shewn upon the Stage the third time.

14 There was another *Actress*, somewhat inferiour in age, but much superiour in dignity, which lived well near ninety years, I mean *Livia Julia Augusta*, wife to *Augustus Caesar*, and mother to *Tiberius*. For if *Augustus* his life were a Play, (as himself would have it, whenas upon his death-bed he charged his friends they should give him a *Plaudite* after he was dead) certainly this Lady was an excellent *Actress*, who could carry it so well with her husband by a dissembled obedience, and with her son by power and authority; a woman affable, and yet of a Matronal carriage, pragmatial, and upholding her power. But *Junia*, the wife of *Caius Cassius*, and sister of *Marcus Brutus*, was also ninety years old; for she survived the *Philippick Battle* fixty four years; a magnanimous woman, in her great wealth happy;

happy; in the calamity of her husband and near kinsfolks; and in a long widow-hood unhappy; notwithstanding much honoured of all.

The year of our Lord seventy six, falling into the time of *Vespasian*, is memorable; in which we shall find, as it were, a *Calendar* of long-lived men: For that year there was a *Taxing*; (now a *Taxing* is the most Authentical and truest Informer touching the ages of men;) and in that part of *Italy* which lieth betwixt the *Apennine Mountains* and the *River Po*, there were found an hundred and four and twenty persons that either equalled or exceeded an hundred years of age; namely, of an hundred years just, fifty four persons; of an hundred and ten, fifty seven persons; of an hundred and five and twenty, two onely; of an hundred and thirty, four men; of an hundred and five and thirty, or seven and thirty, four more; of an hundred and forty, three men. Besides these, *Parma* in particular afforded five, whereof three fulfilled an hundred and twenty years, and two an hundred and thirty: *Bruxels* afforded one of an hundred and twenty five years old; *Placentia* one, aged an hundred thirty and one; *Faventia* one woman, aged one hundred thirty and two; a certain Town, then called *Kelleiacum*, situate in the Hills about *Placentia*, afforded ten, whereof six fulfilled an hundred and ten years of age, four, an hundred and twenty: Lastly, *Rimini* one of an hundred and fifty years, whose name was *Marcus Aponius*.

15

That our Catalogue might not be extended too much in length, we have thought fit, as well in those whom we have rehearsed, as in those whom we shall rehearse, to offer none under eighty years of age. Now we have affixed to everyone a true and short Character or Elogie; but of that sort whereunto, in our judgment, Length of Life (which is not a little subject to the Manners and Fortunes of men) hath some relation; and that in a two-fold respect: either that such kind of men are for the most part long-lived; or that such men may sometimes be of long life, though otherwise not well disposed for it.

16

Amongst the *Roman* and *Grecian Emperors*, also the *French* and *Almain*, to these our days, which make up the number of well-near two hundred Princes, there are onely four found that lived to eighty years of age: unto whom we may add the two first Emperors, *Augustus* and *Tiberius*; (whereof the latter fulfilled the seventy and eighth year, the former the seventy and sixth year of his age, and might both perhaps have lived to fourscore, if *Livia* and *Cains* had been pleased. *Augustus* (as was said) lived seventy and six years: a man of moderate disposition; in accomplishing his designs vehement, but otherwise calm and serene; in meat and drink sober, in Venery intemperate, through all his life-time happy; and who about the thirtieth year of his life had a great and dangerous sickness, insomuch as they despaired of life in him; whom *Antonius Musa* the Physician, when other Physicians had applied hot Medicines, as most agreeable to his Disease, on the contrary cured with cold Medicines, which perchance might be some help to the prolonging of his life. *Tiberius* lived to be two years older: A man with lean chaps, as *Augustus* was wont to say, for his speech stuck within his jaws, but was weighty. He was bloudy, a drinker; and one that took Lust into a part of his diet; notwithstanding a great observer of his health, insomuch that he used to say, That he was a fool that after thirty years of age took advice of a Physician. *Gordian* the elder lived eighty years, and yet died a violent death when he was scarce warm in his Empire: a man of an high spirit and renowned, learned, and a Poet, and constantly happy throughout the whole course of his life, save onely that he ended his days by a violent death. *Valerian* the Emperour was seventy six years of age before he was taken prisoner by *Sapor* King of *Persia*; after his Captivity he lived seven years in reproches, and then died a violent death also: a man of a poor mind, and not valiant; notwithstanding lifted up in his own and the opinion of men; but falling short in the performance. *Anastasius*, surnamed *Dicorus*, lived eighty eight years: he was of a settled mind, but too abject, and superstitious, and fearful. *Anicim Justinianus* lived to eighty three years: a man greedy of glory, performing nothing in his own person, but in the valour of his Captains happy and renowned; uxorious, and not his own man, but suffering others to lead him. *Helena* of *Britain*, mother of *Constantine* the Great, was fourscore years old: a woman that intermeddled not in matters of State neither in her husband's nor son's reign; but devoted her self wholly to Religion, magnanimous, & perpetually flourishing. *Theodora* the Empress (who was sister to *Zoe*, wife

wife of *Monomachus*, and reigned alone after her decease) lived above eighty years : a pragmatistical woman, and one that took delight in Governing, fortunate in the highest degree, and through her good fortunes credulous.

17

We will proceed now from these *Secular Princes* to the *Princes* and the *Church*. *St. John*, an Apostle of our *Saviour*, and the *Beloved Disciple*, lived ninety three years. He was rightly denoted under the *Emblem* of the *Eagle*, for his piercing sight into the *Divinity*; and was as a *Seraph* amongst the *Apostles* in respect of his burning Love. *St. Luke* the *Evangelist* fulfilled fourscore and four years: an eloquent man; and a Traveller, *St. Paul's* inseparable Companion, and a *Physician*. *Simon* the son of *Cleophas*, called the *Brother of our Lord*, and Bishop of *Jerusalem*, lived an hundred and twenty years, though he was cut short by Martyrdom: a stout man, and constant, and full of good works. *Polycarpus*, *Disciple* unto the *Apostles*, and Bishop of *Smyrna*, seemeth to have extended his age to an hundred years and more, though he were also cut off by Martyrdom: a man of an high mind, of an herical patience, and unwearied with labours. *Dionysius Areopagita*, Contemporary to the Apostle *St. Paul*, lived ninety years: he was called the *Bird of Heaven* for his high-flying *Divinity*, and was famous as well for his holy life as for his Meditations. *Aquila* and *Priscilla*, first *St. Paul* the Apostle's Hosts, afterward his Fellow-helpers, lived together in a happy and famous Wedlock at least to an hundred years of age a-piece; for they were both alive under Pope *Xistus* the first: a noble Pair, and prone to all kind of charity, who amongst other their comforts (which no doubt were great unto the first *Founders* of the *Church*) had this added, to enjoy each other so long in an happy marriage. *St. Paul* the *Hermite* lived an hundred and thirteen years: now he lived in a Cave, his diet was so slender and strict, that it was thought almost impossible to support humane nature therewithall: he passed his years onely in Meditations and Soliloquies; yet he was not illiterate or an Idiot, but learned. *St. Anthony*, the first Founder of *Monks*, or (as some will have it) the Restorer onely, attained to an hundred and five years of age: a man devout and contemplative, though not unfit for Civil affairs, his life was austere and mortifying, notwithstanding he lived in a kind of glorious solitude; and exercised a command, for he had his *Monks* under him. And besides, many *Christians* and *Philosophers* came to visit him as a living Image, from which they parted not without some adoration. *St. Athanasius* exceeded the term of eighty years: a man of an invincible constancy, commanding fame, and not yielding to Fortune: he was free towards the Great ones, with the People gracious and acceptable, beaten and practised to oppositions, and in delivering himself from them stout and wise. *St. Jerom*, by the consent of most Writers, exceeded ninety years of age: a man powerful in his Pen, and of a manly Eloquence, variously learned both in the Tongues and Sciences, also a Traveller, and that lived strictly towards his old age, in an estate private, and not dignified; he bore high Spirits, and shined far out of obscurity.

18

The *Popes* of *Rome* are in number to this day two hundred forty and one. Of so great a number five onely have attained to the age of fourscore years, or upwards. But in many of the first *Popes* their full age was intercepted by the Prerogative and Crown of Martyrdom. *John* the twenty third, *Pope* of *Rome*, fulfilled the ninetieth year of his age: a man of an unquiet disposition, and one that studied novelty: he altered many things, some to the better, others onely to the new; a great accumulator of Riches and Treasures. *Gregory*, called the twelfth, created in Schism, and not fully acknowledged *Pope*, died at ninety years: of him, in respect of his short *Papacy*, we find nothing to make a judgment upon. *Paul* the third lived eighty years and one: a temperate man, and of a profound wisdom: he was Learned, an Astrologer, and one that tended his health carefully; but, after the example of old *Eli* the Priest, over-indulgent to his Family. *Paul* the fourth attained to the age of eighty three years: a man of an harsh nature and severe, of an haughty mind and imperious, prone to anger, his speech was eloquent and ready. *Gregory* the thirteenth fulfilled the like age of eighty three years: an absolute good man, sound in mind and body, politick, temperate, full of good works, and an alms-giver.

19

Those that follow are to be more promiscuous in their order, more doubtful in their faith, and more barren of observation. King *Arganthonius*, who reigned at *Cadix* in

Spain,

Spain lived an hundred and thirty, or (as some would have it) an hundred and forty years, of which he reigned eighty. Concerning his Manners, Institution of his Life, and the time wherein he reigned, there is a general silence. *Cyniras* King of *Cyprus*, living in the *Island* then termed the *Happy and Pleasant Island*, is affirmed to have attained to an hundred and fifty or sixty years. Two *Latini Kings* in *Italy*, the Father and the Son, are reported to have lived, the one eight hundred, the other six hundred years: but this is delivered unto us by certain *Philologists*, who though otherwise credulous enough, yet themselves have suspected the truth of this matter, or rather condemned it. Others record some *Arcadian Kings* to have lived three hundred years: the Country, no doubt, is a place apt for long life; but the Relation I suspect to be fabulous. They tell of one *Dando* in *Illyrium*, that lived without the inconveniencies of old age to five hundred years. They tell also of the *Epians*, a part of *Ætolia*, that the whole Nation of them were exceeding long-liv'd, insomuch that many of them were two hundred years old; and that one principal man amongst them, named *Litorius*, a man of a Giant-like stature, could have told three hundred years. It is recorded, that on the top of the Mountain *Tmolus*, anciently called *Tempis*, many of the Inhabitants lived to an hundred and fifty years. We read that the *Sect* of the *Essians* amongst the *Jews* did usually extend their life to an hundred years: Now that *Sect* used a single or abstemious diet, after the rule of *Pythagoras*. *Apollonius Tyanicus* exceeded an hundred years, his face bewraying no such age: he was an admirable man, of the *Heathens* reputed to have something Divine in him, of the *Christians* held for a Sorcerer; in his diet *Pythagorical*, a great traveller, much renowned, and by some adored as a god: notwithstanding, towards the end of his life he was subject to many complaints against him, and reproches, all which he made shift to escape. But lest his long life should be imputed to his *Pythagorical* diet, and not rather that it was hereditary, his Grand-father before him lived an hundred and thirty years. It is undoubted that *Quintus Metellus* lived above an hundred years, and that after several *Consulships* happily administr'd, in his old age he was made *Pontifex Maximus*, and exercised those holy duties full two and twenty years; in the performance of which Rites his voice never failed, nor his hand trembled. It is most certain that *Appius Cæcus* was very old, but his years are not extant, the most part whereof he pass'd after he was blind; yet this misfortune no whit softned him, but that he was able to govern a numerous Family, a great Retinue and Dependence, yea, even the Commonwealth it self, with great stoutness. In his extreme old age he was brought in a Litter into the *Senate-house*, and vehemently dissuaded the Peace with *Pyrrhus*: the beginning of his Oration was very memorable, shewing an invincible spirit and strength of mind; *I have with great grief of mind (Fathers Conscript) these many years born my blindness, but now I could wish that I were deaf also, when I hear you speak to such dishonourable Treaties.* *Marcus Perpenna* lived ninety eight years, surviving all those whose Suffrages he had gather'd in the *Senate-house*, being *Consul*, I mean, all the *Senators* at that time; as also all those whom a little after, being *Consul*, he chose into the *Senate*, seven onely being excepted. *Hiero* King of *Sicily*, in the time of the second *Punick War*, lived almost an hundred years: a man moderate both in his Government and in his Life; a worshipper of the gods, and a religious conserver of Friendship; liberal, and constantly fortunate. *Statilia*, descended of a noble Family in the days of *Claudius*, lived ninety nine years. *Clodia*, the daughter of *Ofilius*, an hundred and fifteen. *Xenophilus*, an ancient Philosopher, of the *Sect* of *Pythagoras*, attained to an hundred and six years, remaining healthful and vigorous in his old age, and famous amongst the vulgar for his learning. The *Islanders* of *Corcyra* were anciently accounted long-liv'd, but now they live after the rate of other men, *Hippocrates* *Coms*, the famous *Physician*, lived an hundred and four years, and approved and credited his own Art by so long a life: a man that coupl'd Learning and Wisdom together, very conversant in Experience and Observation; one that hunted not after Words or Methods, but severed the very Nerves of Science, and so propounded them. *Demonax* a Philosopher, not onely in Profession but practice, lived in the days of *Adrian* almost to an hundred years: a man of an high mind, and a vanquisher of his own mind, and chartruly and without affectation; a contemner of the world, and yet civil and courteous. When his friends spake to him about his Burial, he said, *Take no care for my Burial, for Stench will bury a Carcase.* They replied, *Is it your mind*

mind then to be cast out to Birds and Dogs? He said again, *Seeing in my life-time I endeavour'd to my uttermost to benefit Men, what hurt is it if when I am dead I benefit Beasts?* Certain *Indian* People called *Pandora* are exceedingly long-liv'd, even to no less than two hundred years. They adde a thing more marvelous, That having, when they are boys, an hair somewhat whitish, in their old age, before their gray hairs, they grow coal-black, though indeed this be every where to be seen, that they which have white hair whilst they are boys, in their man's estate change their hairs into a darker colour. The *Seres*, another People of *India*, with their Wine of Palms are accounted long-livers, even to an hundred and thirty years. *Euphranor* the *Grammarian* grew old in his School, and taught Scholars when he was above an hundred years old. The elder *Ovid*, father to the *Poet*, liv'd ninety years, differing much from the disposition of his son, for he contemned the *Muses*, and dissuaded his son from Poetry. *Asinius Pollio*, intimate with *Augustus*, exceeded the age of an hundred years: a man of an unreasonable Profuseness, Eloquent, and a lover of Learning; but vehement, proud, cruel, and one that made his private ends the centre of his thoughts. There was an opinion, that *Seneca* was an extreme old man, no less than an hundred and fourteen years of age: which could not possibly be, it being as improbable that a decrepit old man should be set over *Nero's* Youth, as, on the contrary, it was true, that he was able to manage with great dexterity the affairs of State: besides, a little before, in the midst of *Claudius* his Reign, he was banished *Rome* for Adulteries committed with some *Noble Ladies*, which was a Crime no way compatible with so extreme old age. *Johannes de Temporibus*, among all the men of our later Ages, out of a common fame and vulgar opinion, was reputed long-liv'd, even to a miracle, or rather, even to a fable; his age hath been counted above three hundred years: he was by Nation a *French-man*, and followed the Wars under *Charls* the Great. *Garcins Aretine*, Great Grand-father to *Petrarch*, arrived at the age of an hundred and four years: he had ever enjoyed the benefit of good health; besides, at the last, he felt rather a decay of his strength, than any sickness or malady, which is the true resolution by old age. Amongst the *Venetians* there have been found not a few long-livers, and those of the more eminent sort: *Franciscus Donatus*, Duke; *Thomas Contarenius*, Procurator of *St. Mark*; *Franciscus Molinus*, Procurator also of *St. Mark*, and others. But most memorable is that of *Cornarius* the *Venetian*, who being in his youth of a sickly body, began first to eat and drink by measure to a certain weight, thereby to recover his health: this Cure turned by use into a Diet, that Diet to an extraordinary long Life, even of an hundred years and better, without any decay in his senses, and with a constant enjoying of his health. In our age *William Pessel*, a *French-man*, liv'd to an hundred and well-nigh twenty years, the top of his beard on the upper lip being black, and not gray at all: a man crazed in his brain, and of a fancy not altogether sound; a great Traveller, Mathematician, and somewhat stained with *Heresie*.

20 I suppose there is scarce a *Village* with us in *England*, if it be any whit populous, but it affords some Man or Woman of fourscore years of age; nay, a few years since there was in the County of *Hereford* a May-game or Morrice-dance, consisting of eight men, whose age computed together made up eight hundred years, insomuch that what some of them wanted of an hundred, others exceeded as much.

21 In the *Hospital* of *Bethlehem*, corruptly called *Bedlam*, in the *Suburbs* of *London*, there are found from time to time many mad persons that live to a great age.

22 The ages of *Nymphs*, *Fauns*, and *Satyrs*, whom they make to be indeed mortal, but yet exceedingly long-liv'd, (a thing which ancient Superstition and the late Credulity of some have admitted) we account but for *Fables* and *Dreams*; especially being that which hath neither consent with *Philosophy* nor with *Divinity*. And as touching the *History* of Long Life in Man by Individuals, or next unto Individuals, thus much. Now we will pass on to *Observations* by certain Heads.

23 The *Running* on of *Ages*, and *Succession* of *Generations*, seem to have no whit abated from the length of Life; for we see that from the time of *Moses* unto these our days the term of man's life hath stood about fourscore years of age, neither hath it declined (as a man would have thought) by little and little. No doubt there are times in every Country wherein men are longer or shorter liv'd.

Longer,

Longer, for the most part, when the times are barbarous, and men fare less deliciously, and are more given to bodily exercises: Shorter, when the times are more civil, and men abandon themselves to luxury and ease. But these things pass on by their turns, the succession of Generations alters it not. The same, no doubt, is in other living Creatures; for neither Oxen, nor Horses, nor Sheep, nor any the like, are abridged of their wonted ages at this day. And therefore the Great Abridger of Age was the Flood; and perhaps some such notable accidents (as particular Inundations, long Droughts, Earth-quakes, or the like) may do the same again. And the like reason is in the dimension and stature of Bodies, for neither are they lessened by succession of Generations, howsoever Virgil (following the vulgar opinion) divined, that after-Ages would bring forth lesser Bodies than the then present: whereupon speaking of ploughing up the *Æmalian* and *Æmonensian* Fields, he saith, *Grandiâq; effissis mirabitur ossa Sepulchris; That after-ages shall admire the great bones digged up in ancient Sepulchres.* For whereas it is manifested that there were heretofore men of Gigantine Statures, (such as for certain have been found in *Sicily*, and else-where, in ancient Sepulchres and Cavés) yet within these last three thousand years, a time whereof we have sure memory, those very places have produced none such: although this thing also hath certain turns and changes, by the Civilizing of a Nation, no less than the former. And this is the rather to be noted, because men are wholly carried away with an opinion, that there is a continual decay by Succession of Ages, as well in the term of man's Life as in the stature and strength of his Body; and that all things decline and change to the worse.

In Cold and Northern Countries men live longer commonly than in Hot: which must needs be in respect the skin is more compact and close, and the juices of the body less dissipable, and the Spirits themselves less eager to consume, and in better disposition to repair, and the Air (as being little heated by the Sun-beams) less predatory: And yet under the *Æquinoctial Line*, where the Sun passeth to and fro, and causeth a double Summer and double Winter, and where the Days and Nights are more equal, (if other things be concurring) they live also very long; as in *Peru* and *Taprobane*.

24

Islanders are, for the most part, longer-liv'd than those that live in Continents: for they live not so long in *Russia* as in the *Orcades*; nor so long in *Africa*, though under the same Parallel, as in the *Canaries* and *Tercera's*; and the *Japonians* are longer-liv'd than the *Chineses*, though the *Chineses* are made upon long life. And this thing is no marvel, seeing the Aire of the Sea doth heat and cherish in cooler Regions, and cool in hotter.

25

High Situations do rather afford long-Livers than Low, especially if they be not Tops of Mountains, but Rising Grounds; as to their general Situations, such as was *Arcadia* in *Greece*, and that part of *Ætolia* where we related them to have lived so long. Now there would be the same reason for Mountains themselves, because of the pureness and clearness of the Air, but that they are corrupted by accident, namely, by the Vapours rising thither out of the Valleys, and resting there; and therefore in Snowy Mountains there is not found any notable long life, not in the *Alps*, not in the *Pyrenean Mountains*, not in the *Apennine*: yet in the tops of the Mountains running along towards *Æthiopia* and the *Abyssines*, where by reason of the Sands beneath little or no Vapour riseth to the Mountains, they live long, even at this very day, attaining many times to an hundred and fifty years.

26

Marshes and Fens are propitious to the Natives, and malignant to Strangers, as touching the lengthning and shortning of their lives: and that which may seem more marvellous, Salt Marshes, where the Sea Ebbs and Flows, are less wholesome than those of Fresh Water.

27

The Countries which have been observed to produce long-livers are these; *Arcadia*, *Ætolia*, *India* on this side *Ganges*, *Brasil*, *Taprobane*, *Britain*, *Ireland*, with the Islands of the *Orcades* and *Hebrides*: for as for *Æthiopia*, which by one of the Ancients is reported to bring forth long-Livers, it is but a toy.

28

It is a Secret; The healthfulness of Air, especially in any perfection, is better found by Experiment than by Discourse or Conjecture. You may make a trial by a lock of Wool exposed for a few days in the open Air, if the weight be not much increased;

29

increased; another by a piece of flesh exposed likewise, if it corrupt not over-soon; another by a Weather-glass, if the Water interchange not too suddenly. Of these and the like enquire further.

30 Not onely the *Goodness* or *Pureness* of the *Air*, but also the *Equality* of the *Air*, is material to long life. Intermixture of Hills and Dales is pleasant to the sight, but suspected for long life. A Plain, moderately drie, but yet not over-barren or sandy, nor altogether without Trees and Shade, is very convenient for length of life.

31 *Inequality* of *Air* (as was even now said) in the place of our dwelling is naught; but *Change* of *Air* by travelling, after one be used unto it, is good; and therefore great Travellers have been long-liv'd. Also those that have lived perpetually in a little Cottage, in the same place, have been long-livers: for air accustomed consumeth less; but air changed nourisheth and repaireth more.

32 As the continuation and number of Successions (which we said before) makes nothing to the Length or Shortness of Life; so the *immediate condition* of the *Parents*, (as well the Father as the Mother) without doubt availeth much. For some are begotten of old men, some of young men, some of men of middle age; again, some are begotten of fathers healthful and well-disposed, others of diseased and languishing; again, some of fathers immediately after repletion, or when they are drunk, others after sleeping, or in the morning; again, some after a long intermission of *Venus*, others upon the act repeated; again, some in the fervency of the father's love, (as it is commonly in Bastards) others after the cooling of it, as in long-married couples. The same things may be considered on the part of the Mother; unto which must be added the condition of the Mother whilst she is with child, as touching her health, as touching her diet, the time of her bearing in the womb, to the tenth month, or earlier. To reduce these things to a Rule, how far they may concern *Long Life*, is hard; and so much the harder, for that those things which a man would conceive to be the best will fall out to the contrary: For that alacrity in the Generation which begets lusty and lively children, will be less profitable to long life, because of the Acrimony and inflaming of the Spirits. We said before, That to partake more of the mother's blood conduceth to long life: also we suppose all things in moderation to be best; rather Conjugal love then Meretricious; the hour for Generation to be the morning; a state of body not too lusty or full, and such like. It ought to be well observed, that a strong Constitution in the Parents is rather good for them then for the Child, especially in the Mother: And therefore *Plato* thought, ignorantly enough, that the virtue of Generations halted, because the Women used not the same exercise both of mind and body with the Men. The contrary is rather true; for the difference of virtue betwixt the Male and the Female is most profitable for the Child; and the thinner Women yield more towards the nourishment of the Child: which also holds in Nurses. Neither did the *Spartan Women*, which married not before twenty two, or, as some say, twenty five, (and therefore were called *Man-like women*) bring forth a more generous or long-liv'd Progeny then the *Roman*, or *Athenian*, or *Theban Women* did, which were ripe for Marriage at twelve or fourteen years; and if there were any thing eminent in the *Spartans*, that was rather to be imputed to the Parsimony of their Diet then to the late Marriages of their Women. But this we are taught by experience, that there are some Races which are long-liv'd for a few Descents; so that Life is like some Diseases, a thing hereditary within certain bounds.

33 *Fair* in *Face*, or *Skin*, or *Hair*, are shorter livers; *Black*, or *Red*, or *Freckled*, longer. Also too fresh a colour in Youth doth less promise long life then paleness. A *hard skin* is a sign of long life rather then a *soft*; but we understand not this of a *rugged skin*, such as they call the *Goose skin*, which is as it were spongie, but of that which is hard and close. A *Fore-head* with deep furrows and wrinkles is a better sign then a smooth and plain *Fore-head*.

34 The *Hairs* of the *Head* hard and like bristles do betoken longer life then those that are soft and delicate. *Curled Hairs* betoken the same thing, if they be hard withall; but the contrary, if they be soft and shining: the like if the *curling* be rather thick then in large bunches.

35 Early or late *Baldness* is an indifferent thing, seeing many which have been

Bald

Bald betimes have lived long. Also early *gray hairs* (howsoever they may seem fore-runners of old age approaching) are no sure signs; for many that have grown *gray* betimes have lived to great years: nay, *hasty gray hairs* without *Baldness* is a token of long life; contrarily, if they be accompanied with *Baldness*.

Hairiness of the upper parts is a sign of short life, and they that have extraordinary much hair on their breasts live not long: but *hairiness* of the lower parts, as of the Thighs and Legs, is a sign of long life.

Tallness of *Stature* (if it be not immoderate) with convenient making, and not too slender, especially if the body be active withall, is a sign of long life: Also on the contrary, men of low stature live long, if they be not too active and stirring.

In the proportion of the body, they which are short to the *Waistes*, with long Legs, are longer-liv'd then they which are long to the *Waistes*, and have short Legs: also they which are large in the *neather parts*, and streight in the upper, (the making of their body rising, as it were, into a sharp figure) are longer-liv'd then they that have broad shoulders, and are slender downwards.

Leanness, where the affections are settled, calm, and peaceable; also a more fat habit of body, joynd with *Choler*, and a disposition stirring and peremptory, signifie long life: but *Corpulency* in Youth fore-shews short life, in Age it is a thing more indifferent.

To be long and slow in growing is a sign of long life; if to a greater stature, the greater sign; if to a lesser stature, yet a sign though: contrarily, to grow quickly to a great stature is an evil sign; if to a small stature, the less evil.

Firm flesh, a raw-bone body, and veins lying higher then the flesh, betoken long life; the contrary to these, short life.

A Head somewhat lesser then to the proportion of the body; a moderate Neck, nor long, nor slender, nor fat, nor too short; wide *Nostrils*, whatsoever the form of the Nose be; a large Mouth; an Ear gristly, not fleshy; Teeth strong and contiguous, small, or thin-set, fore-token long life; and much more if some new Teeth put forth in our elder years.

A broad Breast, yet not bearing out, but rather bending inwards; Shoulders somewhat crooked, and (as they call such persons) round-back'd; a flat Belly; a Hand large, and with few lines in the Palm; a short and round Foot, Thighs not fleshy, and Calves of the Legs not hanging over, but near, are signs of long life.

Eyes somewhat large, and the Circles of them inclined to greenness; Senses not too quick; the Pulse in youth slower, towards old age quicker; Facility of holding the Breath, and longer then usual; the body in youth inclined to be bound, in the decline of years more laxative, are also signs of long life.

Concerning the Times of Nativity, as they refer to long life, nothing hath been observed worthy the setting down, save onely *Astrological Observations*, which we rejected in our Topicks. A Birth at the eighth month is not onely long-liv'd, but not likely to live: Also *Winter-births* are accounted the longer-liv'd.

A *Pythagorical* or *Monastical Diet*, according to strict rules, and always exactly equal, (as that of *Cornarus* was) seemeth to be very effectual for long life. Yet on the contrary, amongst those that live freely and after the common sort, such as have good stomachs, and feed more plentifully, are often the longest-liv'd. The middle diet, which we account the temperate, is commended; and conduceth to good health; but not to long life: for the spare diet begets few Spirits, and dull, and so wasteth the body less; and the liberal diet yieldeth more ample nourishment, and so repaireth more: but the middle diet doth neither of both, for where the Extremes are hurtful, there the Mean is best; but where the Extremes are helpfull, there the Mean is nothing worth.

Now to that spare diet there are requisite Watching, lest the Spirits being few should be oppressed with much sleep; little Exercise, lest they should exhale; abstinence from Venery, lest they should be exhausted: but to the liberal diet, on the other side, are requisite much Sleep, frequent Exercises, and a seasonable use of Venery. Baths and Anointings (such as were anciently in use) did rather tend to deliciousness then to prolonging of life. But of all these things we shall speak more exactly when we come to the Inquisition according to Intentions. Mean-while that of Celsus, who was not onely a learned Physician, but a wise man, is not to be omitted, who adviseth interchanging and alternation of the diet, but still with an inclination to the more benign: as that a man should sometimes accustom himself to watching,

watching, sometimes to sleep, but to sleep oftnest: again, that he should sometimes give himself to fasting, sometimes to feasting; but to feasting oftnest: that he should sometimes inure himself to great labours: of the mind, sometimes to relaxations of the same; but to relaxations oftnest. Certainly this is without all question; that *Diet* well ordered bears the greatest part in the prolongation of life: neither did I ever meet an extreme long-liv'd man; but being asked of his course, he observed something peculiar, some one thing, some another. I remember an *old man*, above an hundred years of age, who was produced as a witness touching an ancient Prescription. When he had finished his testimony the Judge familiarly asked him How he came to live so long. He answered, beside expectation, and not without the laughter of the hearers, *By eating beset I was hungry, and drinking before I was dry.* But of these things we shall speak hereafter.

47

A Life led in Religion and in Holy Exercises seemeth to conduce to long life. There are in this kind of life these things, Leisure, Admiration and Contemplation of heavenly things, Joys not sensual, noble Hopes, wholesome Fears, sweet Sorrows, lastly, continual Renovations by Observances, Penances, Expiations &c. all which are very powerful to the prolongation of life. Unto which if you add that austere diet which hardneth the mass of the Body, and humbleth the Spirits, no marvel if an extraordinary length of life do follow; such as was that of *Paul the Hermite*, *Simeon Stylita the Columnar Anchorite*, and of many other *Hermites* and *Anchorites*.

48

Next unto this is the life led in good Letters, such as was that of Philosophers, Rhetoricians, Grammarians. This life is also led in leisure, and in those thoughts which, seeing they are severed from the affairs of the world, bite not, but rather delight through their Variety and Impertinency: They live also at their pleasure, spending their time in such things as like them best, and for the most part in the company of young men, which is ever the most chearful. But in Philosophies there is great difference betwixt the Sects as touching long life: For those Philosophies which have in them a touch of Superstition, and are conversant in high Contemplations, are the best; as the *Pythagorical* and *Platonick*: also those which did institute a perambulation of the world, and considered the variety of natural things, and had reachless, and high, and magnanimous thoughts, (as of *Infinitum*, of the Stars, of the Heroical Vertues, and such like) were good for lengthning of life; such were those of *Democritus*, *Philolaus*, *Xenophanes*, the Astrologians and Stoicks: also those which had no profound Speculation in them, but discoursed calmly on both sides, out of common Sense, and the received Opinions, without any sharp Inquisitions, were likewise good; such were those of *Carneades* and the *Academicks*, also of the Rhetoricians and Grammarians. But contrarily, Philosophies conversant in perplexing Subtilties, and which pronounced peremptorily, and which examined and wrested all things to the Scale of Principles, lastly, which were thorny and narrow, were evil: such were those commonly of the *Peripateticks* and of the *School-men*.

49

The Country life also is well fitted for long life: it is much abroad, and in the open air, it is not slothful, but ever in employment; it feedeth upon fresh Cates, and unbought; it is without Cares and Envy.

50

For the Military life, we have a good opinion of that whilst a man is young. Certainly many excellent Warriors have been long-liv'd; *Corvinus*, *Camillus*, *Xenophon*, *Agefilau*, with others, both ancient and modern. No doubt it furthereth long life to have all things from our youth to our elder age mend, and grow to the better, that a Youth full of crosses may minister sweetness to our Old age. We conceive also that Military affections, inflamed with a desire of Fighting, and hope of Victory, do infuse such a heat into the Spirits, as may be profitable for long life.

Medicines

Medicines for Long Life.

THE Art of Physick, which we now have, looks no further commonly then to Conservation of Health and Cure of Diseases: As for those things which tend properly to Long Life, there is but slight mention, and by the way onely. Notwithstanding we will propound those Medicines which are notable in this kind, I mean, those which are Cordials. For it is consonant to reason, that those things which being taken in Cures do defend and fortifie the Heart, or, more truly, the Spirits, against Poisons and Diseases, being transferred with judgment and choice into Diet, should have a good effect, in some sort, towards the Prolonging of Life. This we will doe, not heaping them promiscuously together, (as the manner is) but selecting the best.

To the tenth Article.

Gold is given in three forms; either in that which they call *Aurum potabile*, or in Wine wherein Gold hath been quenched, or in Gold in the Substance, such as are Leaf-gold, and the Filings of Gold. As for *Aurum potabile*, it is used to be given in desperate or dangerous diseases, and that not without good success. But we suppose that the Spirits of the Salt, by which the Gold is dissolved, do rather minister that virtue which is found in it, then the Gold itself; though this secret be wholly suppressed. Now if the body of Gold could be opened without these Corrosive waters, or by these Corrosive waters (so the venomous quality were wanting) well washed, we conceive it would be no unprofitable Medicine.

Pearls are taken either in a fine Powder, or in a certain Mass, or Dissolution by the juice of four and new Limons, and they are given sometimes in Aromaticall Confections, sometimes in Liquor. The Pearl, no doubt, hath some affinity with the Shell in which it groweth, and may be of the same quality with the Shells of *Cra-fishes*.

Amongst the transparent precious Stones, two onely are accounted Cordial, the Emerald and the *Jacinth*, which are given under the same forms that the Pearls are; save onely that the dissolutions of them, as far as we know, are not in use. But we suspect these Glassie Jewels, lest they should be cutting.

Of these which we have mentioned, how far and in what manner they are helpful, shall be spoken hereafter.

Bezoar-Stone is of approved virtue for refreshing the Spirits, and procuring a gentle Sweat. As for the Unicorn's Horn, it hath lost the credit with us; yet so, as it may keep rank with Hart's Horn, and the Bone in the heart of a Hart, and Ivory, and such like.

Amber-grieee is one of the best to appease and comfort the Spirits.

Hereafter follow the names onely of the Simple Cordials, seeing their Virtues are sufficiently known.

Hot.	Hot.	Cold.	Cold.
Saffron.	Clove-Gilly-flowers.	Nitre.	Juice of Sweet
Folium Indum.	Orange-flowers.	Roses. Violets.	Oranges.
Lignum Aloes.	Rosemary.	Strawberry-	Juice of Pearmains.
Citron Pill or	Mint.	Leaves.	Borage.
Rinde.	Betony.	Straw-berries.	Bugloss.
Balm.	Carduus Benedi-	Juice of sweet	Burnet. Sanders.
Basil.	ctm.	Limons.	Camphire.

Seeing our speech now is of those things which may be transferred into Diet, all hot Waters and Chymical Oiles, (which, as a certain Trifler saith, are under the Planet Mars, and have a furious and destructive force) as also all hot and biting Spices are to be rejected, and a Consideration to be had, how Waters and Liquors may be made of the former Simples: not those phlegmatick distilled Waters, nor again those burning Waters of Spirits of Wine; but such as may be more temperate, and yet lively, and sending forth a benign Vapour.

I make some question touching the frequent letting of Blood, whether it conduceth to long life or no; and I am rather in the opinion that it doth, if it be turned into a habit, and other things be well disposed: for it letteth out the old Juice of the body, and bringeth in new.

I suppose also, that some *Emaciating Diseases* well cured, do profit to long life, for they yield new Juice, the old being consumed; and, (as he saith) *To recover a sickness is to renew youth*: Therefore it were good to make some *Artificial Diseases*, which is done by strict and *Emaciating Diets*, of which I shall speak hereafter.

The Intentions.

To the 12,
13, and 14
Articles.

HAVING finished the Inquisition according to the Subjects, as namely, of Inanimate Bodies, Vegetables, Living Creatures, Man; I will now come nearer to the matter, and order mine Inquisitions by certain Intentions, such as are true and proper, (as I am wholly perswaded) and which are the very paths to Mortal Life. For in this part, nothing that is of worth hath hitherto been inquired, but the contemplations of men have been but simple, and non-proficients. For when I hear men on the one side speak of comforting Natural heat, and the Radical moisture, and of Meats which breed good Blood, such as may neither be burnt nor phlegmatick; and of the cheering and recreating the Spirits; I suppose them to be no bad men which speak these things: but none of these worketh effectually towards the end. But when on the other side I hear several discourses touching Medicines made of Gold, because Gold is not subject to corruption: and touching Precious Stones to refresh the Spirits by their hidden properties and lustre, and that if they could be taken and retained in Vessels, the Balsoms, and Quintessences of living Creatures, would make men conceive a proud hope of Immortality: And that the Flesh of Serpents and Harts, by a certain consent, are powerful to the Renovation of Life, because the one casteth his Skin, the other his Horns: (they should also have added the Flesh of Eagles, because the Eagle changes his Bill) And that a certain Man, when he had found an Ointment hidden under the ground, and had anointed himself therewith from head to foot, (excepting only the soles of the feet) did, by his anointing, live three hundred years, without any disease, save only some Tumors in the soles of his feet: and of Artelius, who when he found his Spirit ready to depart, drew into his body the Spirit of a certain young man, and thereby made him breathless, but himself lived many years by another man's Spirit: And of Fortunate Hours according to the Figures of Heaven, in which Medicines are to be gathered and compounded for the prolongation of Life: And of the Seals of Planets, by which vertues may be drawn and fetched down from Heaven to prolong Life: and suchlike fabulous and superstitious vanities: I wonder exceedingly that men should so much doat, as to suffer themselves to be deluded with these things. And again, I do pity Man-kind that they should have the hard fortune to be besieged with such frivolous and senseless apprehensions. But mine Intentions do both come home to the Matter, and are far from vain and credulous Imaginations; being also such, as I conceive, Posterity may adde much to the matters which satisfy these Intentions; but to the Intentions themselves, but a little. Notwithstanding there are a few things, and those of very great moment, of which I would have men to be forewarned.

First, we are of that opinion, that we esteem the Offices of Life to be more worthy then Life it self. Therefore if there be any thing of that kind that may indeed exactly answer our Intentions, yet so, that the Offices and Duties of Life be thereby hindred; whatsoever it be of this kind, we reject it. Perhaps we may make some light mention of such things, but we insist not upon them. For we make no serious nor diligent discourse, either of leading the life in Caves, where the Sun-beams and several changes of the Air pierce not, like Epimenides his Cave; or of perpetual Baths, made of Liquors prepared; or of Shirts, and Sear-cloths so applied, that the Body should be always as it were in a Box; or of thick paintings of the body, after the manner of some Barbarous Nations; or of an exact ordering of our Life and Diet, which aimeth only at this, and mindeth nothing else but that a man live, (as was that of Herodicus amongst the Ancients, and of Cornarus the Venetian in our days, but with greater moderation;) or of any such Prodigie, Tediousness, or Inconvenience: but we proponnd such Remedies and Precepts, by which the Offices of Life may neither be deserted, nor receive any great interruptions or molestations.

Secondly,

Secondly, on the other side we denounce unto men that they will give over trifling, and not imagine that so great a work as the stopping and turning back the powerful course of nature, can be brought to pass by some Morning-draught, or the taking of some precious Drug; but that they would be assured that it must needs be, that this is a work of labour, and consisteth of many Remedies, and a fit connexion of them amongst themselves; for no man can be so stupid as to imagine, that what was never yet done, can be done, but by such ways as were never yet attempted.

Thirdly, we ingenuously profess, that some of those things which we shall propound have not been tried by us by way of Experiment, (for our course of life doth not permit that) but are derived (as we suppose) upon good reason; out of our Principles and Grounds, (of which some we set down, others we reserve in our mind) and are, as it were, cut and digged out of the Rock and Mine of Nature her self. Nevertheless we have been careful, and that with all providence and circumspection, (seeing the Scripture saith of the Body of Man, that it is more worth then Raiment) to propound such Remedies, as may at least be safe, if peradventure they be not fruitful.

Fourthly, we would have men rightly to observe and distinguish, that those things which are good for an Healthful Life, are not always good for a Long Life; for there are some things which do further the alacrity of the Spirits, and the strength and vigour of the Functions, which, notwithstanding, do cut off from the sum of Life; and there are other things which are profitable to prolongation of Life, which are not without some peril of health, unless this matter be salved by fit Remedies; of which, notwithstanding, as occasion shall be offered, we will not omit to give some Cautions and Monitions.

Lastly, we have thought good to propound sundry Remedies, according to the several Intentions; but the choice of those Remedies, and the order of them, to leave to Discretion; for to set down exactly which of them agreeth best, with which Constitution of Body, which with the several courses of Life, which with each Man's particular Age, and how they are to be taken one after another, and how the whole Practique of these things is to be administr'd and governed, would be too long, neither is it fit to be published.

In the Topicks we propounded three Intentions: The Prohibiting of Consumption, The Perfecting of Reparation, and the Renewing of Oldness. But seeing those things which shall be said are nothing less then words, we will deduce these three Intentions to ten Operations.

The first is, the Operation upon the Spirits that they may renew their vigour.

The second Operation is upon the Exclusion of Air.

The third Operation is upon the Bloud, and the Sanguifying Heat.

The fourth Operation is upon the Juices of the Body.

The fifth Operation is upon the Bowels, for their Extrusion of Aliment.

The sixth Operation is upon the Outward Parts, for their Attraction of Aliment.

The seventh Operation is upon the Aliment it self, for the Insinuation thereof.

The eighth Operation is upon the last Act of Assimilation.

The ninth Operation is upon the Inteneration of the Parts, after they begin to be dried.

The tenth Operation is upon the Purging away of Old Juice, and Supplying of New Juice.

Of these Operations, the four first belong to the First Intention, the four next to the Second Intention, and the two last to the Third Intention.

But because this part touching the Intentions doth tend to Practise, under the name of History, we will not onely comprise Experiments and Observations, but also Counsels, Remedies, Explications of Causes, Assumptions, and whatsoever hath reference hereunto.

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*The Operation upon the Spirits that they may remain
Youthful, and renew their Vigour.*

The History.



THE *Spirits* are the Master-workmen of all effects in the *Body*. This is manifest by Consent, and by infinite instances.

If any man could procure that a young man's *Spirits* could be conveyed into an old man's *Body*, it is not unlikely but this great Wheel of the *Spirits* might turn about the lesser Wheel of the *Parts*, and so the course of Nature become retrograde.

In every Consumption, whether it be by Fire or by Age, the more the *Spirit* of the *Body*, or the *Heart*, preyeth upon the Moisture, the lesser is the duration of that thing. This occurs every where, and is manifest.

The *Spirits* are to be put into such a temperament and degree of activity, that they should not (as he saith) drink or guzzle the juices of the *Body*, but sip them only.

There are two kinds of *Flames*: the one eager and weak, which consumes slight substances, but hath little power over the harder; as the flame of Straw, or small Sticks: the other strong and constant, which converts hard and obstinate substances; as the flame of hard wood, and such like.

The eager flames, and yet less robust, do drie *Bodies*, and render them exhaust and sapless; but the stronger flames do intenerate and melt them.

Also in *Dispersing Medicines*, some vapour forth the thin part of the tumors or swellings, and these harden the tumor; others potently discuss, and these soften it.

Also in *Purging and Absterging Medicines*, some carry away the fluid humors violently, others draw the more obstinate and viscous.

The *Spirits* ought to be invested and armed with such a heat, that they may chuse rather to stir and undermine hard and obstinate matters, then to discharge and carry away the thin and prepared; for by that means the *Body* becomes green and solid.

The *Spirits* are so to be wrought and tempered, that they may be in Substance Dense, not Rare; in Heat Strong, not Eager; in Quantity Sufficient for the offices of Life, not Redundant or Turgid; in Motion Appealed, not Dancing or Unequal.

That *Vapours* work powerfully upon the *Spirits*, it is manifest by Sleep, by Drunkenness, by Melancholick Passions, by leſſificant Medicines, by Odours, calling the *Spirits* back again in Swounings and Faintings.

The *Spirits* are condensed four ways: either by putting them to flight, or by refrigerating and cooling them, or by stroking them, or by quiescing them. And first of their Condensation by putting them to flight.

Whatsoever putteth to flight on all parts driveth the body into his Centre, and so Condenseth.

To the Condensation of the *Spirits* by flight, the most powerful and effectual is *Opium*, and next *Opiates*, and generally all *Soporiferous things*.

The force of *Opium* to the condensation of the *Spirits* is exceeding strong, whenas perhaps three grains thereof will in a short time so coagulate the *Spirits*, that they return no more, but are extinguished, and become immoveable.

Opium and the like put not the *Spirits* to flight by their coldness, for they have parts manifestly hot; but, on the contrary, cool by their putting the *Spirits* to flight.

The Flight of the *Spirits* by *Opium* and *Opium Medicines* is best seen by applying the same outwardly; for the *Spirits* straight with-draw themselves, and will return no more, but the part is mortified, and turns to a *Gangrene*.

Opiates, in grievous pains, as in the Stone, or the cutting off of a Limb, mitigate pains most of all by putting the *Spirits* to flight.

Opiates obtain a good effect from a bad cause; for the Flight of the *Spirits* is evil, but the Condensation of them through their flight is good.

The *Greeks* attributed much, both for health and for prolongation of life, to *Opiates*: but the *Arabians* much more, insomuch that their *grand Medicines* (which they called the *gods Hands*) had *Opium* for their Basis and principal Ingredient; other things being mixed to abate and correct the noxious qualities thereof; such were *Treacle*, *Mithridate*, and the rest.

Whatsoever is given with good success in the curing of *Possential* and *Malignant Diseases*, to stop and bridle the *Spirits*, lest they grow turbulent and tumultuate; may very happily be transferred to the prolongation of life; for one thing is effectual unto both, namely, the condensation of the *Spirits*: now there is nothing better for that than *Opiates*.

The *Turks* find *Opium*, even in a reasonable good quantity, harmless and comfortable, insomuch that they take it before their Battle to excite courage: but to us, unless it be in a very small quantity, and with good Correctives, it is mortal.

Opium and *Opiates* are manifestly found to excite *Venus*; which shews them to have force to corroborate the *Spirits*.

Distilled Water of *wilde Poppy* is given with good success in Surfeits, Agues, and divers diseases; which no doubt is a temperate kind of *Opiate*. Neither let any man wonder at the various use of it, for that is familiar to *Opiates*, in regard that the *Spirits*, corroborated and condensed, will rise up against any disease.

The *Turks* use a kind of Herb which they call *Capbe*, which they dry and powder, and then drink it in warm water; which, they say, doth not a little sharpen them, both in their Courage and in their Wits; notwithstanding, if it be taken in a large quantity, it affects and disturbs the mind: whereby it is manifest, that it is of the same nature with *Opiates*.

There is a Root much renowned in all the *Eastern parts*, which they call *Beitel*, which the *Indians* and others use to carry in their mouths, and to champ it, and by that champing they are wonderfully enabled both to endure labours, and to overcome sicknesses, and to the act of carnal copulation: It seems to be a kind of *Stupefactive*, because it exceedingly blacks the Teeth.

Tobacco in our age is immoderately grown into use, and it affects men with a secret kind of delight; insomuch that they who have once inured themselves unto it can hardly afterwards leave it: and no doubt it hath power to lighten the body, and to shake off weariness. Now the virtue of it is commonly thought to be, because it opens the passages, and voids humors: but it may more rightly be referred to the condensation of the *Spirits*; for it is a kind of *Henbane*, and manifestly troubles the Head, as *Opiates* do.

There are sometimes *Humors* engendred in the body, which are, as it were, *Opiate* themselves; as it is in some kind of *Melancholies*, with which if a man be affected, it is a sign of very long life.

The simple *Opiates* (which are also called *Stupefactives*) are these: *Opium* it self, which is the juice of *Poppy*; both the *Poppits*, as well in the Herbs as in the Seed; *Henbane*, *Mandrake*, *Hemlock*, *Tobacco*, *Nightshade*.

The compound *Opiates* are, *Treacle*, *Mithridate*, *Trifera*, *Ladannum*, *Paracelsi*, *Diaconium*, *Diascordium*, *Philonium*, *Pills of Hounds-tongue*.

From this which hath been said certain Designations or Counsels may be deduced for the prolongation of life, according to the present intention; namely, of condensing the *Spirits* by *Opiates*.

Let there be therefore every year, from Adult years of Youth, an *Opiate* diet: let it be taken about the end of *May*, because the *Spirits* in the Summer are more loose and attenuated, and there are less dangers from cold humors: let it be some *Magistral Opiate*, weaker then those that are commonly in use, both in respect of a smaller quantity of *Opium*, and of a more sparing mixture of extreme hot things; let it be taken in the morning betwixt sleeps. The fare for that time would be more simple and sparing then ordinary, without Wine, or Spices, or Vaporous things. This Medicine to be taken onely each other day, and to be continued for a fortnight. This Designation in our judgment comes home to the intention.

Opiates also may be taken, not onely by the mouth, but also by *Fumes*; but the *Fumes* must be such as may not move the expulsive Faculty too strongly, nor force down humors, but onely taken in a *Wet*, may work upon the *Spirits* within the brain. And therefore a *Suffumigation* of *Tobacco*, *Lignum-Aloes*, *Rosemary-leaves*

dried, and a little *Myrrhe* snuffed up in the morning at the mouth and nostrils would be very good.

34 In *Grand Opiates*, such as are *Treacle*, *Mithridate*, and the rest, it would not be amiss (especially in youth) to take rather the *distilled Waters* of them than themselves in their bodies; for the vapour in distilling doth rise, but the heat of the Medicine commonly setleth. Now *distilled Waters* are good in those vertues which are conveyed by Vapours, in other things but weak.

35 There are Medicines which have a certain weak and hidden degree, and therefore safe to an *Opiate* vertue; these send forth a slow and copious vapour, but not malignant as *Opiates* doe, therefore they put not the Spirits to *fright*; notwithstanding they congregate them, and somewhat thicken them.

36 Medicines in order to *Opiates* are principally *Saffron*, next *Folium Indum*, *Amber-griese*, *Coriander-seed* prepared, *Amomum*, *Pseuda-momum*, *Lignum Rhodium*, *Orange-flower water*, and much more the *Infusion* of the same *Flowers* new gathered in *Oil of Almonds*; *Nutmegs* pricked full of holes, and macerated in *Rose-water*.

37 As *Opiates* are to be taken very sparingly, and at certain times, as was said, so these secondaries may be taken familiarly, and in our daily diet, and they will be very effectual to prolongation of life. Certainly an *Apothecary* of *Calcutte*, by the use of *Amber*, is said to have lived an hundred and sixty years; and the *Noble-men* of *Barbary*, through the use thereof, are certifi'd to be very long-liv'd, whereas the mean people are but of short life. And our *Ancestors*, who were longer-liv'd then we, did use *Saffron* much in their Cakes, Broths, and the like. And touching the first way of condensing the Spirits by *Opiates* and the *Subordinates* thereto, thus much.

38 Now we will enquire of the second way of condensing the *Spirits* by *Cold*. For the proper work of *Cold* is *Condensation*, and it is done without any malignity, or adverse quality; and therefore it is a safer operation then by *Opiates*, though somewhat less powerful, if it be done by turns onely, as *Opiates* are. But then again, because it may be used familiarly, and in our daily diet with moderation, it is much more powerful for the prolongation of life then by *Opiates*.

39 The *Refrigeration* of the *Spirits* is effected three ways, either by *Respiration*, or by *Vapours*, or by *Aliment*. The first is the best, but, in a sort, out of our power; the second is potent, but yet ready, and at hand; the third is weak, and somewhat about.

40 *Air* clear and pure, and which hath no fogginess in it, before it be received into the Lungs, and which is least exposed to the Sun-beams, condenseth the *Spirits* best. Such is found either on the tops of dry Mountains, or in Champagnes open to the winde, and yet not without some shade.

41 As for the *Refrigeration* and *Condensation* of the *Spirits* by *Vapours*, the Root of this operation we place in *Nitre*, as a Creature purposely made and chosen for this end, being thereunto led and perswaded by these Arguments.

42 *Nitre* is a kind of cool Spice: this is apparent to the sense it self, for it bites the Tongue and Palate with cold, as Spices do with heat, and it is the onely thing, as far as we know, that hath this property.

43 Almost all cold things (which are cold properly, and not by accident, as *Opium* is) are poor and jejune of Spirit; contrarily, things full of Spirit are almost all hot, onely *Nitre* is found amongst Vegetables, which aboundeth with Spirit, and yet is cold. As for *Camphire*, which is full of Spirit, and yet performeth the actions of cold, it cooleth by accident onely, as namely, for that by the thinness thereof, without Acrimony, it helpeth perspiration in inflammations.

44 In congeling and freezing of *Liquors*, (which is lately grown into use) by laying Snow and Ice on the out-side of the Vessel, *Nitre* is also added, and no doubt it exciteeth and fortifieth the *Congelation*. It is true, that they use also for this work ordinary Bay-Salt, which doth rather give activity to the coldness of the Snow, then cool by it self: But, as I have heard, in the hotter Regions where Snow falls not, the congeling is wrought by *Nitre* alone; but this I cannot certainly affirm.

45 It is affirmed that *Gunn-powder*, which consisteth principally of *Nitre*, being taken in drink, doth conduce to valour, and that it is used oftentimes by Mariners and Soldiers before they begin their Battels, as the *Turks* do *Opium*.

Nitre is given with good success in burning Agues, and Pestilential Fevers, to mitigate and bridle their pernicious heats.

It is manifest, that *Nitre* in *Gun-powder* doth mightily abhor the Flame, from whence is caused that horrible Crack and Puffing.

Nitre is found to be, as it were, the *Spirit* of the Earth: for this is most certain, that any Earth, though pure and unmixt with Nitrous matter, if it be so laid up and covered, that it be free from the Sun-beams, and putteth forth no *Vegetable*, will gather *Nitre*, even in good abundance. By which it is clear, that the *Spirit* of *Nitre* is not only inferior to the *Spirit* of living Creatures, but also to the *Spirit* of *Vegetables*.

Cattle which drink of *Nitrous* water do manifestly grow fat, which is a sign of the cold in *Nitre*.

The manuring of the Soil is chiefly by *Nitrons* substances; for all *Dung* is *Nitrons*, and this is a sign of the *Spirit* in *Nitre*.

From hence it appears, that the *Spirits* of Man may be cooled and condensed by the *Spirit* of *Nitre*, and be made more crude, and less eager. And therefore, as strong Wines, and Spices, and the like, do burn the *Spirits*, and shorten life; so on the contrary side, *Nitre* doth compose and repress them, and furthereth to life.

Nitre may be used with meat, mixed with our Salt, to the tenth part of the Salt; in Broths taken in the morning, from three grains to ten, also in Beer: but howsoever it be used, with moderation, it is of prime force to long life.

As *Opium* holds the preheminance in condensing the *Spirits*, by putting them to *flight*, and hath withall his *Subordinates*, less potent, but more safe, which may be taken both in greater quantity, and in more frequent use, of which we have formerly spoken: so also *Nitre*, which condenseth the *Spirits* by cold, and by a kind of *Frei-cour*, (as we now a-days speak) hath also his *Subordinates*.

Subordinates to *Nitre* are, all those things which yield an Odour somewhat Earthy, like the smell of Earth, pure and good, newly digged or turned up; of this sort the chief are, *Borage*, *Bugloss*, *Langue de Pœuf*, *Burnet*, *Strawberry-leaves* and *Strawberries*, *Frambois* or *Raspis*, raw *Cucumbers*, raw *Pearmains*, *Vine-leaves* and *Buds*; also *Violets*.

The next in order are those which have a certain freshness of smell, but somewhat more inclined to heat; yet not altogether void of that virtue of refreshing by coolness; such as are *Balm*, *green Citrons*, *green Oranges*, *Rose-water* distilled, *roasted Wardens*; also the *Damask*, *Red*, and *Musk* *Roses*.

This is to be noted, that *Subordinates* to *Nitre* do commonly confer more to this *Intention*, *Raw*, then having passed the Fire, because that *Spirit* of Cooling is dissipated by the Fire: therefore they are best taken, either infused in some liquor, or raw.

As the condensation of the *Spirits* by *Subordinates* to *Opium* is, in some sort, performed by *Odours*, so also that which is by *Subordinates* to *Nitre*; therefore the smell of new and pure *Earth*, taken either by following the Plough, or by digging, or by weeding, excellently refresheth the *Spirits*. Also the Leaves of Trees in Woods, or Hedges, falling towards the middle of Autumn, yield a good refreshing to the *Spirits*; but none so good as *Strawberry-leaves* dying. Likewise the smell of *Violets*, or *Wall-flowers*, or *Bean-flowers*, or *Sweet-briar*, or *Hony-suckles*, taken as they grow, in passing by them onely, is of the same nature.

Nay, and we know a certain great Lord who lived long, that had every morning immediately after sleep, a Clod of fresh *Earth* laid in a fair Napkin under his Nose, that he might take the smell thereof.

There is no doubt, but the cooling and tempering of the blood by cool things, such as are *Endive*, *Succoury*, *Liver-wort*, *Purslain*, and the like, do also by consequent cool the *Spirits*; but this is about, whereas vapours cool immediately.

And as touching the condensing of the *Spirits* by Cold, thus much: The third way of condensing the *Spirits*, we said to be by that which we call *stroaking* the *Spirits*: The fourth, by *quieting* the *alacrity* and *unruliness* of them.

Such things *stroke* the *Spirits* as are pleasing and friendly to them, yet they allure them not to go abroad; but rather prevail, that the *Spirits* contented, as it were, in

in their own society, do enjoy themselves, and betake themselves into their proper Centre.

61 For these, if you recollect those things which were formerly set down, as *Subordinates* to *Opium* and *Nitre*, there will need no other *Inquisition*.

62 As for the quieting of the *unruliness* of the *Spirits*, we shall presently speak of that, when we enquire touching their *Motion*. Now then, seeing we have spoken of that *Condensation* of the *Spirits* which pertaineth to their substance, we will come to the *temper* of *Heat* in them.

63 The *Heat* of the *Spirits*, as we said, ought to be of that kind that it may be *robust*, not *eager*, and may delight rather to master the tough and obstinate, then to carry away the thin and light humors.

64 We must beware of *Spices*, *Wine*, and strong *Drinks*, that our use of them be very temperate, and sometimes discontinued; also of *Savory*, *Wild-marjoram*, *Peny-royal*, and all such as bite and heat the tongue; for they yield unto the *Spirits* an *heat* not *Operative*, but *Predatory*.

65 These yield a *robust heat*, especially *Elecampane*, *Garlick*, *Carduus Benedictum*, *Water-creffes* while they are young, *Germander*, *Angelica*, *Zedoary*, *Vervain*, *Valerian*, *Myrrhe*, *Pepper-wort*, *Elder-flowers*, *Garden-Chervile*: The use of these things with choice and judgment, sometimes in Sallads, sometimes in Medicines, will satisfie this *Operation*.

66 It falls out well that the *Grand Opiates* will also serve excellently for this *Operation*, in respect that they yield such an *heat* by composition, which is wished, but not to be found, in *Simples*. For the mixing of those excessive hot things (such as are *Eupharbium*, *Pellitory of Spain*, *Stavis-acre*, *Dragon-wort*, *Anacardi*, *Castorium*, *Aristolochium*, *Opoponax*, *Ammoniacum*, *Galbanum*, and the like, which of themselves cannot be taken inwardly) to qualifie and abate the *Strupestative* virtue of the *Opium*, they do make such a constitution of a Medicament as we now require; which is excellently seen in this, That *Treacle*, and *Mithridate*, and the rest, are not sharp, nor bite the tongue, but are onely somewhat bitter, and of strong sent, and at last manifest their heat when they come into the stomach, and in their subsequent operations.

67 There conduce also to the *robust heat* of the *Spirits* *Venus* often excited, rarely performed; and no less some of the affections, of which shall be spoken hereafter. So touching the heat of the *Spirits*, Analogical to the prolongation of Life, thus much.

68 Touching the *Quantity* of the *Spirits*, that they be not *exuberant* and *boiling*, but rather *sparing*, and within a mean, (seeing a small flame doth not devour so much as a great flame) the *Inquisition* will be short.

69 It seems to be approved by experience, that a *spare Diet*, and almost a *Pythagorical*, such as is either prescribed by the strict Rules of a *Monastical life*, or practised by *Hermites*, which have Necessity and Poverty for their Rule, rendreth a man long-liv'd.

70 Hitherto appertain drinking of *Water*, a *hard Bed*, *abstinence from Fire*, a *slender Diet*, (as namely, of *Herbs*, *Fruits*, *Flesh*, and *Fish*, rather powdered and salted then fresh and hot) an *Hair-shirt*, frequent *Fastings*, frequent *Watchings*, few sensual *Pleasures*, and such like; for all these diminish the *Spirits*, and reduce them to such a *quantity* as may be sufficient onely for the Functions of Life, whereby the depredation is the less.

71 But if the *Diet* shall not be altogether so *rigorous* and *mortifying*, yet notwithstanding shall be always *equal* and *constant* to it self, it worketh the same effect. We see it in *Flames*, that a *Flame* somewhat bigger (so it be always alike and quiet) consumeth less of the Fuel then a lesser *Flame* blown with *Bellows*, and by *Gusts* stronger or weaker: That which the *Regiment* and *Diet* of *Cornarus* the *Venetian* shewed plainly, who did eat and drink so many years together by a just weight, whereby he exceeded an hundred years of age, strong in limbs, and entire in his senses.

72 Care also must be taken, that a body plentifully nourished, and not emaciated by any of these aforesaid Diets, omitteth not a seasonable use of *Venus*, lest the *Spirits* increase too fast, and soften and destroy the body. So then, touching a moderate *quantity* of *Spirits*, and (as we may say) *Frugal*, thus much.

73 The *Inquisition* touching bridling the motions of the *Spirits* followeth next.

Motion

Motion doth manifestly attenuate and inflame them. This bridling is done by three means: by *Sleep*; by avoiding of vehement Labours, immoderate Exercise, and, in a word, all *Lassitude*; and by refraining irksome Affections. And first, touching *Sleep*.

The Fable tells us, that *Epimenides* slept many years together in a Cave, and all that time needed no meat, because the *Spirits* waste not much in sleep.

Experience teacheth us that certain Creatures, as *Dormice* and *Bats*, sleep in some close places an whole Winter together; such is the force of sleep to restrain all vital Consumption. That which *Bees* and *Drones* are also thought to doe, though sometimes destitute of *Hony*; and likewise *Butter-flies*, and other *Flies*.

Sleep after *Dinner* (the stomach sending up no displeasing Vapours to the head, as being the first Dews of our Meat) is good for the *spirits*, but derogatory and hurtful to all other points of health. Notwithstanding in extreme old age there is the same reason of Meat and *Sleep*, for both our meals and our sleeps should be then frequent, but short and little; nay, and towards the last period of old age, a mere *Rest*, and, as it were, a perpetual *Reposing* doth best, especially in Winter-time.

But as moderate sleep conferreth to long life, so much more if it be quiet and not disturbed.

These procure quiet sleep, *Violets*, *Lettuce*, especially boiled, *Syrup* of dried *Roses*, *Saffron*, *Balm*, *Apples*, at our going to bed; a sop of *Bread* in *Malmsey*, especially where *Musk-Roses* have been first infused: therefore it would not be amiss to make some *Pill*, or a small Draught of these things, and to use it familiarly. Also those things which shut the mouth of the stomach close, as *Coriander-seed* prepared, *Quinces* and *Wardens* roasted, do induce sound sleep; but above all things in youth, and for those that have sufficient strong stomachs, it will be best to take a good draught of clear cold *Water* when they go to bed.

Touching voluntary and procured Trances, as also fixed and profound Thoughts, so as they be without irksomness, I have nothing certain: no doubt they make to this Intention, and condense the *Spirits*, and that more potently then *Sleep*, seeing they lay asleep, and suspend the senses as much or more. Touching them, let further inquiry be made. So far touching *Sleep*.

As for *Motion* and *Exercise*, *Lassitude* hurteth, and so doth all *Motion* and *Exercise* which is too nimble and swift, as *Running*, *Tennis*, *Fencing*, and the like; and again, when our strength is extended and strained to the uttermost, as *Dancing*, *Wrestling*, and such like: for it is certain, that the *spirits* being driven into streights, either by the swiftness of the motion, or by the straining of the forces, do afterward become more eager and predatory. On the other side, *Exercises* which stir up a good strong motion, but not over-swift, or to our utmost strength, (such as are *Leaping*, *Shooting*, *Riding*, *Bowling*, and the like) do not hurt, but rather benefit.

We must come now to the Affections and Passions of the Mind, and see which of them are hurtful to long life, which profitable.

Great Joys attenuate and diffuse the *spirits*, and shorten life; familiar Chearfulness strengthens the *spirits*, by calling them forth, and yet not resolving them.

Impressions of Joy in the sense are naught; ruminations of Joy in the memory, or apprehensions of them in hope or fancy, are good.

Joy suppressed, or communicated sparingly, doth more comfort the *spirits* then Joy poured forth and published.

Grief and Sadness, if it be void of Fear, and afflict not too much, doth rather prolong life; for it contracteth the *spirits*, and is a kind of condensation.

Great Fears shorten the life: for though Grief and Fear do both streighten the spirit, yet in Grief there is a simple contraction; but in Fear, by reason of the cares taken for the remedy, and hopes intermixed, there is a turmoil and vexing of the *spirits*.

Anger suppressed is also a kind of vexation, and causeth the spirit to feed upon the juices of the body; but let loose and breaking forth, it helpeth: as those Medicines do which induce a robust heart.

Envy is the worst of all Passions, and feedeth upon the *spirits*, and they again upon the body; and so much the more because it is perpetual, and, as it is said, keepeth no holidays.

Fury of another man's misfortune, which is not likely to befall our selves, is good: but

but *Pity*, which may reflect with some similitude upon the party pining, is naught, because it exciteeth *Fear*.

88 *Light Shame* hurteth not, seeing it contracteth the *spirits* a little, and then straight diffuseth them; insomuch that *shamefac'd* persons commonly live long: but *Shame* for some great ignominy, and which afflicteth the mind long, contracteth the *spirits* even to suffocation, and is pernicious.

89 *Love*, if it be not unfortunate, and too-deeply wounding, is a kind of *joy*, and is subject to the same Laws which we have set down touching *joy*.

90 *Hope* is the most beneficial of all the *Affections*, and doth much to the prolongation of life, if it be not too often frustrated, but entertaineth the Fancy with an expectation of good: therefore they which fix and propound to themselves some end, as the mark and scope of their life, and continually and by degrees go forward in the same, are, for the most part, long-liv'd; insomuch that when they are come to the top of their hope, and can go no higher therein, they commonly droop, and live not long after: So that *Hope* is a *Leaf-joy*, which may be beaten out to a great extension, like *Gold*.

91 *Admiration* and *light Contemplation* are very powerful to the prolonging of life; for they hold the *spirits* in such things as delight them, and suffer them not to tumultuate, or to carry themselves unquietly and waywardly. And therefore all the *Contemplators* of *Natural things*, which had so many and so eminent Objects to admire, (as *Democritus*, *Plato*, *Parmenides*, *Apollonius*) were long-liv'd: also *Rhetoricians*, which tasted but lightly of things, and studied rather Exornation of speech then profundity of matters, were also long-liv'd; as *Gorgias*, *Protagoras*, *Isocrates*, *Seneca*. And certainly, as old men are for the most part talkative, so talkative men do often grow very old; for it shews a *light contemplation*, and such as doth not much strain the *spirits*, or vex them: but subtil, and acute, and eager inquisition shortens life; for it tireth the *spirits*, and wasteth it.

And as touching the motion of the *Spirits* by the *Affections* of the *Mind*, thus much. Now we will add certain other general *Observations* touching the *Spirits*, beside the former, which fall not into the precedent distribution.

92 Especiall care must be taken that the *Spirits* be not too often resolved; for attenuation goeth before resolution, and the *spirit* once attenuated doth not very easily retire, or is condensed. Now *Resolution* is caused by over-great labours, over-vehement affections of the mind, over-great sweats, over-great evacuations, hot Baths, and an untemperate and unseasonable use of *Venus*; also by over-great cares and carpings, and anxious expectations; lastly, by malignant diseases, and intolerable pains and torments of the body: all which, as much as may be, (which our vulgar *Physicians* also advise) must be avoided.

93 The *spirits* are delighted both with wonted things, and with new. Now it maketh wonderfully to the conservation of the *spirits* in vigour, that we neither use wonted things to a satiety and glutting; nor new things, before a quick and strong appetite. And therefore both *customs* are to be broken off with judgment and care, before they breed a fulness; and the *appetite* after new things to be restrained for a time, until it grow more sharp and jocund: and moreover, the *life*, as much as may be, so to be ordered, that it may have many *renovations*, and the *spirits* by perpetual conversing in the same actions may not wax dull. For though it were no ill saying of *Seneca's*, *The fool doth ever begin to live*; yet this folly, and many more such, are good for long life.

94 It is to be observed touching the *spirits*, (though the contrary useth to be done) That when men perceive their *spirits* to be in good, placid, and healthful state, (that which will be seen by the tranquillity of their *Mind*, and chearful disposition) that they cherish them, and not change them: but when, in a turbulent and untoward state, (which will also appear by their sadness, lumpishness, and other indisposition of their mind) that then they straight overwhelm them, and alter them. Now the *spirits* are contained in the same state, by a restraining of the affections, temperateness of diet, abstinence from *Venus*, moderation in labour, indifferent rest and repose: and the contrary to these do alter and overwhelm the *spirits*; as namely, vehement affections, profuse feasting, immoderate *Venus*, difficult labours, earnest studies, and prosecution of business. Yet men are wont, when they are merriest and best disposed, then to apply themselves to feasting,

Venus,

Venus, Labours, Endeavours, Businesſes; whereas if they have a regard to long life, (which may ſeem ſtrange) they ſhould rather praſtiſe the contrary. For we ought to cheriſh and preſerve good ſpirits, and for the evil-diſpoſed ſpirits to diſcharge and alter them.

Ficinus ſaith not unwiſely, That old men, for the comforting of their ſpirits, ought often to remember and ruminare upon the *Acts* of their *Childhood* and *Youth*. Certainly ſuch a remembrance is a kind of peculiar Recreation to every old man: and therefore it is a delight to men to enjoy the ſociety of them which have been brought up together with them, and to viſit the places of their education. *Veſpaſian* did attribute ſo much to this matter, that when he was *Emperour* he would by no means be perſwaded to leave his father's houſe, though but mean, leſt he ſhould loſe the wonted object of his eyes, and the memory of his childhood; and beſides, he would drink in a wooden Cup, tipped with ſilver, which was his *Grand-mother's*, upon *Festival days*.

One thing above all is grateful to the *Spirits*, that there be a continual progreſs to the more *benign*; therefore we ſhould lead ſuch a Youth and Manhood, that our Old age ſhould find new Solaces, whereof the chief is moderate eaſe: And therefore old men in honourable places lay violent hands upon themſelves, who retire not to their eaſe: whereof may be found an eminent Example in *Caffiodorus*, who was of that reputation amongſt the *Gothiſh Kings* of *Italy*, that he was as the Soul of their affairs; afterwards, being near eighty years of age, he betook himſelf to a Monastery, where he ended not his days before he was an hundred years old. But this thing doth require two Cautions: one, that they drive not off till their bodies be utterly worn out and diſeaſed; for in ſuch bodies all mutation, though to the more *benign*, haſteneth death: the other, that they ſurrender not themſelves to a ſluggiſh eaſe, but that they embrace ſomething which may entertain their thoughts and mind with contentation; in which kind the chief delights are Reading and Contemplation; and then the deſires of Building and Planting.

Laſtly, the ſame *Action*, *Endeavour* and *Labour* undertaken chearfully and with a good will doth reſreſh the *Spirits*; but with an averſation and unwillingneſs, doth fret and deſect them. And therefore it conſerret to long life, either that a man hath the art to inſtitute his life ſo as it may be free and ſutable to his own humor; or elſe to lay ſuch a command upon his mind, that whatſoever is impoſed by Fortune, it may rather lead him then drag him.

Neither is that to be omitted towards the government of the *Affections*, that eſpecial care be taken of the mouth of the *Stomach*, eſpecially that it be not too much relaxed; for that part hath a greater dominion over the *affections*, eſpecially the daily *affections*, then either the Heart or Brain; onely thoſe things excepted which are wrought by potent vapours, as in Drunkenneſs and Melancholy.

Touching the Operation upon the *Spirits*, that they may remain youthful and renew their vigour, thus much: which we have done the more accurately, for that there is, for the moſt part, amongſt *Phyſicians* and other Authors touching theſe Operations a deep ſilence; but eſpecially, becauſe the Operation upon the *Spirits*, and their waxing green again, is the moſt ready and compendious way to long life; and that for a two-fold compendiouſneſs: one, becauſe the *Spirits* work compendiouſly upon the body; the other, becauſe Vapours and the *Affections* work compendiouſly upon the *Spirits*; ſo as theſe attain the end, as it were, in a right line, other things rather in lines circular,



The Operation upon the Excluſion of the Air. 2.

The Hiſtory.

THE Excluſion of the Air ambient tendeth to length of life two ways: Firſt, for that the External Air, next unto the Native Spirit, (howſoever the Air may be ſaid to animate the Spirit of Man, and conſerret not a little to health) doth moſt of all prey upon the juices of the body,

and hasten the Desiccation thereof; and therefore the *Exclusion* of it is effectual to length of life.

Another effect which followeth the *Exclusion* of *Air* is much more subtil and profound, namely, that the Body closed up, and not perspiring by the Pores, detaineth the *Spirits* within, and turneth it upon the harder parts of the body, whereby the *Spirit* mollifies and intenerates them.

Of this thing the reason is explained in the *Desiccation* of *Inanimate Bodies*; and it is an Axiom almost infallible, That the *Spirit* discharged and issuing forth, drieth *Bodies*; detained, melteth and intenerateth them. And it is further to be assumed, That all Heat doth properly attenuate and moisten, and contracteth and drieth onely by Accident.

Leading the Life in Dens and Caves, where the *Air* receives not the Sun-beams, may be effectual to long life. For the *Air* of it self doth not much towards the depredation of the body, unless it be stirred up by heat. Certainly, if a man shall recall things past to his memory, it will appear that the stature of men have been anciently much greater then those that succeeded, as in *Sicily*, and some other places: but this kind of men led their lives, for the most part, in *Caves*. Now length of life and largeness of limbs have some affinity. The *Cave* also of *Epimenides* walks among the Fables. I suppose likewise, that the life of *Columnar Anchorites* was a thing resembling the life in *Caves*, in respect the Sun-beams could not much pierce thither, nor the *Air* receive any great changes or inequalities. This is certain, both the *Simoon Stelita's*, as well *Daniel* as *Saba*, and other *Columnar Anchorites*, have been exceeding long-liv'd. Likewise the *Anchorites* in our days, closed up and immured either within Walls or Pillars, are often found to be long-liv'd.

Next unto the life in *Caves* is the life on *Mountains*: for as the beams of the Sun do not penetrate into *Caves*; so on the tops of *Mountains*, being destitute of Reflexion, they are of small force. But this is to be understood of *Mountains* where the *Air* is clear and pure; namely, whether by reason of the driness of the Vallies Clouds and Vapours do not ascend; as it is in the Mountains which encompass *Barbary*, where, even at this day, they live many times to an hundred and fifty years, as hath been noted before.

And this kind of *Air* of *Caves* and *Mountains*, of its own proper nature, is little or nothing predatory; but *Air*, such as ours is, which is predatory through the heat of the Sun, ought, as much as is possible, to be excluded from the body.

But the *Air* is prohibited and excluded two ways: first, by *closing* the Pores; secondly, by *filling* them up.

To the *closing* of the Pores help coldness of the air, going naked, whereby the skin is made hard, washing in cold water, Astringents applied to the skin, such as are *Mastic*, *Myrrhe*, *Myrtle*.

But much more may we satisfy this Operation by *Baths*, yet those rarely used, (especially in Summer) which are made of *Astringent Mineral Waters*, such as may safely be used, as Waters participating of Steel and Coperas; for these do potently contract the skin.

As for *filling* up the Pores, *Paintings* and such like *Unctuous daubings*, and (which may most commodiously be used) *Oil* and *fat things*, do no less conserve the substance of the body, then *Oil-colours* and *Varnish* do preserve Wood.

The ancient *Britans* painted their bodies with *Wood*, and were exceeding long-liv'd: the *Picts* also used paintings, and are thought by some to have derived their name from thence.

The *Brazilians* and *Virginians* paint themselves at this day, who are (especially the former) very long-liv'd; insomuch that five years ago the *French Jesuites* had speech with some who remembred the building of *Fernambuck*, which was done an hundred and twenty years since; and they were then at Man's estate.

Joannes de temporibus, who is reported to have extended his life to three hundred years, being asked how he preserved himself so long, is said to have answered, *By Oil without, and by Honey within*.

The *Irish*, especially the *Wild-Irish*, even at this day live very long: certainly they report, that within these few years the *Countess of Desmond* lived to an hundred and forty years of age, and bred Teeth three times. Now the *Irish* have a fashion to chase and, as it were, to bathe themselves with old Salt-butter against the fire.

The same *Irish* use to wear *Saffroned Linen* and *Shirts* : which though it were at first devised to prevent Vermin, yet howsoever I take it to be very useful for lengthning of life; for *Saffron*, of all things that I know, is the best thing for the skin, and the comforting of the flesh, seeing it is both notably Astringent, and hath besides an Oleosity and subtle heat, without any Acrimony. I remember a certain *Englishman*, who when he went to Sea carried a bag of *Saffron* next his stomach; that he might conceal it, and so escape Custom; and whereas he was wont to be always exceeding Sea-sick, at that time he continued very well, and felt no provocation to vomit.

15

Hippocrates adviseth in Winter to wear clean Linen, and in Summer foul Linen and besmeared with Oil. The reason may seem to be, because in Summer the *Spirits* exhale most, therefore the pores of the skin would be filled up.

16

Hereupon we are of opinion, that the use of *Oil*, either of *Olives* or sweet *Almonds*, to anoint the skin therewith, would principally conduce to long life: The anointing would be done every morning when we rise out of bed, with Oil in which a little *Bay-salt* and *Saffron* is mixed. But this anointing must be lightly done with Wool, or some soft sponge, not laying it on thick, but gently touching and wetting the skin.

17

It is certain that *Liquors*, even the Oily themselves, in great quantities draw somewhat from the body; but contrarily, in small quantities are drunk in by the body: therefore the anointing would be but light, as we said, or rather the shirt it self would be besmeared with Oil.

18

It may haply be objected, that this anointing with Oil, which we commend, (though it were never in use with us, and amongst the *Italians* is cast off again) was anciently very familiar amongst the *Grecians* and *Romans*, and a part of their Diet; and yet men were not longer-liv'd in those days then now. But it may rightly be answered, Oil was in use onely after Baths, unless it were perhaps amongst *Champions*: now hot Baths are as much contrary to our operation, as *Anointings* are congruous, seeing the one opens the passages, the other stops them up: therefore the Bath, without the anointing following, is utterly bad; the anointing without the Bath is best of all. Besides, the anointing amongst them was used onely for delicacy, or (if you take it at the best) for health, but by no means in order to long life; and therefore they used them with all precious Ointments, which were good for deliciousness, but hurtful to our intention, in regard of their heat: So that *Virgil* seemeth not to have said amiss,

19

— *Nec Casia liquidi corrumpitur usus Olivi,*

That odoriferous *Casia* hath not supplanted the use of neat Oil-Olive.

Anointing with Oil conduceth to health, both in Winter, by the exclusion of the cold Air, and in Summer, by detaining the spirits within, and prohibiting the Resolution of them, and keeping off the force of the air which is then most predatory.

20

Seeing the anointing with Oil is one of the most potent operations to long life, we have thought good to adde some cautions, lest the health should be endangered: They are four, according to the four *Inconveniences* which may follow thereupon.

21

The first *Inconvenience* is, that by repressing sweats, it may ingender diseases from those excrementitious humours. To this a remedy must be given by *Purges* and *Clysters*, that evacuation may be duly performed. This is certain, that evacuation by sweats commonly advanceth health, and derogateh from long life; but gentle *Purgers* work upon the humors, not upon the spirits, as sweat doth.

22

The second *Inconvenience* is, that it may heat the body, and in time inflame it; for the spirits shut in, and not breaching forth, acquire heat. This inconvenience may be prevented, if the Diet most usually incline to the colder part, and that at times some proper cooling Medicines be taken, of which we shall straight speak in the operation upon the Blood.

23

The third is, that it may annoy the head; for all *Opplerion* from without strikes back the vapours, and sends them up unto the head. This inconvenience is remedied by *Purgers*, especially *Clysters*, and by shutting the mouth of the stomach strongly with *Stripticks*, and by combing and rubbing the head, and by washing it with convenient Lies, that something may exhale, and by not omitting competent and good exercises, that something also may perspire by the skin.

24

25

The fourth *Inconvenience* is a more subtil Evil, namely, that the Spirit being detained by the closing up of the *Pores*, is likely to multiply it self too much; for when little issueth forth, and new Spirit is continually ingendred, the Spirit increaseth too fast, and so preyeth upon the body more plentifully. But this is not altogether so; for all Spirit closed up is dull, (for it is blown and excited with motion as Flame is) and therefore it is less active, and less generative of it self: Indeed it is thereby increased in Heat, (as Flame is) but slow in Motion. And therefore the remedy to this inconvenience must be by cold things, being sometimes mixed with *Oil*, such as are *Roses* and *Myrtles*; for we must altogether disclaim hot things, as we said of *Cassia*.

26

Neither will it be unprofitable to wear next the body Garments that have in them some *Unctuousity* or *Oleosity*, not *Aquosity*, for they will exhaust the body less; such as are those of Woollen rather than those of Linen. Certainly it is manifest in the Spirits of Odours, that if you lay sweet powders amongst Linen, they will much sooner lose their smell than amongst Woollen. And therefore Linen is to be preferred for delicacy and neatness, but to be suspected for our *Operation*.

27

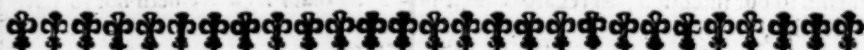
The *Wild Irish*, as soon as they fall sick, the first thing they doe is to take the sheets off their beds, and to wrap themselves in the woollen cloaths.

28

Some report, that they have found great benefit in the conservation of their health by wearing *Scarlet Wascots* next their skin, and under their shirts, as well down to the neather parts as on the upper.

29

It is also to be observed, that *Air* accustomed to the body doth less prey upon it then new *Air* and often changed; and therefore poor people, in small Cottages, who live always within the smell of the same chimney, and change not their seats, are commonly longest liv'd: notwithstanding, to other operations (especially for them whose Spirits are not altogether dull) we judge change of air to be very profitable; but a mean must be used, which may sause on both sides. This may be done by removing our habitation four times a year, at constant and set times, unto convenient seats, that so the body may neither be in too much peregrination, nor in too much station. And touching the *Operation* upon the *Exclusion* of *Air*, and avoiding the predatory force thereof, thus much.



The Operation upon the Bloud, and the Sanguifying Heat. 3.

The History.

1



THE following *Operations* answer to the two precedent, and are in the relation of *Passives* to *Actives*: for the two precedent intend this, that the *Spirits* and *Air* in their actions may be the less predatory; and the two latter, that the *Bloud* and *Juice* of the body may be the less depreable. But because the Bloud is an irrigation or watering of the Juices and Members, and a preparation to them, therefore we will put the operation upon the *Bloud* in the first place. Concerning this *Operation* we will propound certain Counsels, few in number, but very powerful in virtue. They are three.

2

First, there is no doubt, but that if the bloud be brought to a cold temper, it will be so much the less dissippable. But because the cold things which are taken by the mouth agree but ill with many other Intentions, therefore it will be best to find out some such things as may be free from these inconveniences. They are two.

3

The first is this: Let there be brought into use, especially in youth, *Clysters*, not *purgings* at all, or *absterging*, but onely cooling, and somewhat opening: Those are approved which are made of the Juices of *Lettuce*, *Purslane*, *Liver-wort*, *Houfleeke*, and the *Mucilage* of the seed of *Flea-wort*, with some temperate opening decoction, and a little

little *Camphire* : but in the declining age let the *Housleek* and *Purslane* be left out, and the juices of *Borrage* and *Endive* , and the like, be put in their rooms. And let these *Clysters* be retained, if it may be, for an hour or more.

The other is this, Let there be in use, especially in Summer, *Baths* of fresh water, and but luke-warm, altogether without *Emollients* , as *Mallows*, *Mercury*, *Milk*, and the like ; rather take new *Whey* in some good quantity, and *Roses*.

But (that which is the principal in this Intention, and new) we advise, that before the bathing the body be anointed with Oil, with some *thicknes* , whereby the quality of the cooling may be received , and the water excluded : yet let not the pores of the body be shut too close; for when the outward cold closeth up the body too strongly, it is so far from furthering coolness, that it rather forbids it, and stirs up heat.

Like unto this is the use of *Bladders* , with some decoctions and cooling juices, applied to the inferior region of the body, namely, from the ribs to the privy parts; for this also is a kind of *bathing* , where the body of the liquor is for the most part excluded, and the cooling quality admitted.

The third counsel remaineth, which belongeth not to the quality of the *blood* , but to the substance thereof, that it may be made more firm and less dissipable, and such, as the heat of the spirit may have the less power over it.

And as for the use of *Filings* of *Gold* , *Leaf-gold*, *Powder of Pearl* , *Precious stones* , *Coral*, and the like, we have no opinion of them at this day, unless it be onely as they may satisfie this present *Operation*. Certainly, seeing the *Arabians*, *Grecians*, and modern *Physicians* have attributed such virtues to these things, it cannot be altogether Nothing which so great men have observed of them. And therefore omitting all fantastical opinions about them, we do verily believe, that if there could be some such thing conveyed into the whole mass of the blood in minute and fine portions, over which the spirits and heat should have little or no power, absolutely it would not onely resist *Putrefaction*, but *Arefaction* also, and be a most effectual means to the prolongation of life. Nevertheless in this thing several cautions are to be given. First, that there be a most exact comminution. Secondly, that such hard and solid things be void of all malignant qualities, lest while they be dispersed and lurk in the veins, they breed some ill convenience. Thirdly, that they be never taken together with meats, nor in any such manner as they may stick long, lest they beget dangerous obstructions about the *Mesentery*. Lastly, that they be taken very rarely, that they may not congregate and knot together in the veins.

Therefore let the manner of taking them be *fasting* , in *White-wine* , a little *Oil* of *Almonds* mingled therewith, *Exercise* used immediately upon the taking of them.

The *Simples* which may satisfie this *Operation* are, in stead of all, *Gold*, *Pearls*, and *Coral* : for all *Metalls*, except *Gold* , are not without some malignant quality in the dissolutions of them, neither will they be beaten to that exquisite fineness that *Leaf-gold* hath. As for all *glassie* and *transparent Jewels*, we like them not, (as we said before) for fear of *Corrosion*.

But, in our judgment, the safer and more effectual way would be by the use of *Woods* in *Infusions* and *Decoctions* ; for there is in them sufficient to cause *firmness* of *blood*, and not the like danger for breeding obstructions; but especially, because they may be taken in meat and drink, whereby they will find the more easie entrance into the veins, and not be voided in excrements.

The *Woods* fit for this purpose are *Sanders* , the *Oak* and *Vine*. As for all hot *Woods* or something *Rosennie* , we reject them: notwithstanding you may add the *woody stalks* of *Rosemary* dried, for *Rosemary* is a Shrub, and exceedeth in age many Trees; also the *woody stalks* of *Ivie*, but in such quantity as they may not yield an unpleasing taste.

Let the *Woods* be taken either boiled in *Broths* , or infused in *Must* or *Ale* before they leave working: but in *Broths* (as the custom is for *Guaiacum* and the like) they would be infused a good while before the boiling, that the firmer part of the *wood*, and not that onely which lieth loosely, may be drawn forth. As for *Ale*, though it be used for *Cups*, yet we like it not. And touching the *Operation* upon the *Blond* thus much.

The Operation upon the Juices of the Body. 4.

The History.

THere are two kinds of *Bodies* (as was said before in the *Inquisition* touching *Inanimates*) which are hardly consumed, *Hard* things and *Fat* things; as is seen in *Metalls* and *Stones*, and in *Oil* and *Wax*.

It must be ordered therefore, that the *juice* of the *body* be somewhat *hard*, and that it be *fatty* or *subrosid*.

As for *hardness*, it is caused three ways: by *Aliment* of a *firm* nature; by *Cold* condensing the *skin* and *flesh*; and by *Exercise*, binding and compacting the *juices* of the *body*, that they be not soft and frothy.

As for the *Nature* of the *Aliment*, it ought to be such as is not easily *disippable*; such as are *Beef*, *Swine's-flesh*, *Deer*, *Goat*, *Kid*, *Swan*, *Goose*, *Ring-dove*, especially if they be a little *powdred*; *Fish* likewise *salted* and *dried*, *Old Cheese*, and the like.

As for the *Bread*; *Oaten-bread*, or *bread* with some mixture of *Pease* in it, or *Rye-bread*, or *Barley-bread*, are more solid then *Wheat-bread*; and in *Wheat-bread*, the course *Cheat-bread* is more solid then the pure *Manchet*.

The *Inhabitants* of the *Orcades*, which live upon *salted fish*, and generally all *Fish-eaters*, are long-liv'd.

The *Monks* and *Hermites* which fed sparingly, and upon dry *Aliment*, attained commonly to a great age.

Also *pure Water* usually drunk makes the *juices* of the *body* less frothy; unto which if, for the dulness of the *spirits*, (which no doubt in *Water* are but a little penetrative) you shall adde a little *Nitre*, we conceive it would be very good. And touching the *firmness* of the *Aliment* thus much.

As for the *Condensation* of the *skin* and *flesh* by *Cold*: They are longer-liv'd for the most part that live abroad in the *open air*, then they that live in *Houses*; and the *Inhabitants* of the *cold Countries* then the *Inhabitants* of the *hot*.

Great store of *clothes*, either upon the *bed* or *back*, do resolve the *body*.

Washing the *body* in *cold Water* is good for length of life; use of *hot Baths* is naught. Touching *Baths* of *Astringent Mineral Waters* we have spoken before.

As for *Exercise*, an *idle life* doth manifestly make the *flesh* soft and *disippable*; *robust exercise* (so it be without over-much sweating or weariness) maketh it hard and compact. Also *exercise* within *cold Water*, as *swimming*, is very good; and generally *exercise* abroad is better then that within *houses*.

Touching *Frications*, (which are a kind of *exercise*) because they do rather call forth the *Aliment* then *harden* the *flesh*, we will inquire hereafter in the due place.

Having now spoken of *hardning* the *juices* of the *body*, we are to come next to the *Oleosity* or *Fattiness* of them, which is a more perfect and potent *Intention* then *Induration*, because it hath no inconvenience or evil annexed. For all those things which pertain to the *hardning* of the *juices* are of that nature, that while they prohibit the absorption of the *Aliment*, they also hinder the operation of the same; whereby it happens, that the same things are both propitious and adverse to length of life: but those things which pertain to making the *juices* *Oily* and *Roscid*, help on both sides; for they render the *Aliment* both less *disippable*, and more *reparable*.

But whereas we say that the *juice* of the *body* ought to be *Roscid* and *Fat*, it is to be noted that we mean it not of a visible *Fat*, but of a *Dewiness* dispersed, or (if you will call it) *Radical* in the very substance of the *body*.

Neither again let any man think, that *Oil* or the *Fat* of *Meats* or *Marrow* do engender the like, and falsifie our intention: for those things which are once perfect are not brought back again; but the *Aliments* ought to be such, which after digestion and maturation do then in the end engender *Oleosity* in the *Juices*.

Neither again let any man think, that *Oil* or *Fat* by it self and simple is hard of dissipation, but in mixture it doth not retain the same nature: for as *Oil* by it self is much more longer in consuming then *Water*; so in *Paper* or *Linen* it sticketh longer, and is later dried, as we noted before.

To the Irroration of the body roasted meats or baked meats are more effectual then boiled meats, and all preparation of meat with water is inconvenient: besides, Oil is more plentifully extracted out of drie bodies then out of moist bodies.

Generally, to the Irroration of the body much use of sweet things is profitable, as of Sugar, Honey, sweet Almonds, Pine-apples, Pistachio's, Dates, Raisins of the Sun, Corrans, Figs, and the like. Contrarily, all sour, and very salt, and very biting things are opposite to the generation of Roscid Juice.

Neither would we be thought to favour the Manichees, or their diet, though we commend the frequent use of all kinds of Seeds, and Kernels, and Roots, in Meats or Sauces, considering all Bread (and Bread is that which maketh the Meat firm) is made either of Seeds or Roots.

But there is nothing makes so much to the Irroration of the body as the quality of the Drink, which is the convoy of the Meat; therefore let there be in use such Drinks as without all acrimony or sowness are notwithstanding subtil: such are those Wines which are (as the old woman said in *Plantus*) *vetustate edentula*, toothless with age, and Ale of the same kind.

Mead (as we suppose) would not be ill if it were strong and old: but because all Hony hath in it some sharp parts, (as appears by that sharp water which the Chymists extract out of it, which will dissolve metalls) it were better to take the same portion of Sugar, not lightly infused in it, but so incorporated as Hony useth to be in Mead, and to keep it to the age of a year, or at least six months, whereby the Water may lose the crudity, and the Sugar acquire subtilty.

Now ancientness in Wine or Beer hath this in it, that it ingenders subtilty in the parts of the Liquor, and acrimony in the Spirits, whereof the first is profitable, and the second hurtful. Now to rectifie this evil commixture, let there be put into the vessel, before the Wine be separated from the Must, Swines-flesh or Deers-flesh well boiled, that the Spirits of the Wine may have whereupon to ruminate and feed, and so lay aside their mordacity.

In like manner, if Ale should be made not onely with the grains of Wheat, Barly, Oats, Pease, and the like; but also should admit a part (suppose a third part to these grains) of some fat roots, such as are Potado-roots, Pith of Artichokes, Burre-roots, or some other sweet and esculent roots; we suppose it would be a more useful drink for long life then Ale made of grains onely.

Also such things as have very thin parts, yet notwithstanding are without all acrimony or mordacity, are very good Sallets: which virtue we find to be in some few of the Flowers; namely, Flowers of Ivy, which infused in Vinegar are pleasant even to the taste; Marigold-leaves, which are used in Broths; and Flowers of Betony. And touching the operation upon the Juices of the Body thus much.



The Operation upon the Bowels for their Extrusion of Aliment. 5.

The History.

What those things are which comfort the Principal Bowels, which are the fountains of Concoctions, namely, the Stomach, Liver, Heart and Brain, to perform their functions well, (whereby Aliment is distributed into the parts, Spirits are dispersed, and the Reparation of the whole body is accomplished) may be derived from Physicians, and from their Prescripts and Advices.

Touching the Spleen, Gall, Kidneys, Mesenteries, Guts and Lungs, we speak not, for these are members ministring to the principal; and whereas speech is made touching health, they require sometime a most special consideration, because each of these have their diseases, which, unless they be cured, will have influence upon the Principal Members. But as touching the prolongation of life, and reparation by aliments, and retardation of the incoction of old age; if the Concoctions and

those *principal Bowels* be well disposed, the rest will commonly follow according to ones wish.

And as for those things which, according to the different state of every man's body, may be transferred into his Diet and the regiment of his life, he may collect them out of the Books of Physicians, which have written of the comforting and preserving the four *Principal Members*: For conservation of health hath commonly need of no more then some short courses of Physick; but length of life cannot be hoped without an orderly diet, and a constant race of *sovereign Medicines*. But we will propound some few, and those the most select and prime directions.

The *Stomach* (which, as they say, is the Master of the house, and whose strength and goodness is fundamental to the other concoctions) ought so to be guarded and confirmed, that it may be without *intemperateness* hot; next *astringed* or *bound*, not *loose*; furthermore *clean*, not surcharged with foul Humours, and yet (in regard it is nourished from it self, not from the veins) not altogether *empty* or *hungry*: lastly, it is to be kept ever in *appetite*, because *appetite sharpens* digestion.

I wonder much how that same *Calidum bibere*, to drink warm drink, (which was in use amongst the Ancients) is laid down again. I knew a Physician that was very famous, who in the beginning of dinner and supper would usually eat a few spoonfulls of very warm *broth* with much greediness, and then would presently wish that it were out again, saying, *He had no need of the broth, but onely of the warmth*.

I do verily conceive it good, that the first draught either of *Wine*, or *Ale*, or any other *drink*, (to which a man is most accustomed) be taken at supper *warm*.

Wine in which *Gold* hath been quenched, I conceive, would be very good once in a meal; nor that I believe the *Gold* conferreth any virtue thereunto, but that I know that the quenching of all Metalls in any kind of liquor doth leave a most potent *Astringent*: Now I chuse *Gold*, because besides that *Astringent* which I desire, it leaveth nothing else behind it of a metalline impression.

I am of opinion, that sops of bread dipped in wine, taken at the midst of the meal, are better then wine it self; especially if there were infused into the wine in which the sops were dipped *Rose-mary* and *Citron-pill*, and that with *Sugar*, that it may not slip too fast.

It is certain that the use of *Quinces* is good to strengthen the stomach; but we take them to be better if they be used in that which they call *Quiddeny* of *Quinces*, then in the bodies of the *Quinces* themselves, because they lie heave in the stomach. But those *Quiddeny*s are best taken after meals, alone; before meals, dipped in *Vinegar*.

Such things as are good for the stomach above other Simples are these, *Rose-mary*, *Elecampane*, *Mastick*, *Wormwood*, *Sage*, *Mint*.

I allow Pills of *Aloes*, *Mastick* and *Saffron* in Winter-time, taken before dinner; but so, as the *Aloes* be not onely oftentimes washed in *Rose-water*, but also in *Vinegar* in which *Tragacanth* hath been infused, and after that be macerated for a few hours in Oil of sweet *Almonds* new drawn, before it be made into Pills.

Wine or *Ale* wherein *Wormwood* hath been infused, with a little *Elecampane* and yellow *Sanders*, will doe well, taken at times, and that especially in Winter.

But in Summer, a draught of *White-wine* allayed with *Strawberry-water*, in which Wine Powder of Pearls and of the shells of *Cra-fishes* exquisitely beaten and (which may perhaps seem strange) a little *Chalk* have been infused, doth excellently refresh and strengthen the stomach.

But generally, all *Draughts* in the morning (which are but too frequently used) of cooling things, as of Juices, Decoctions, Whey, Barley-waters, and the like are to be avoided, and nothing is to be put into the stomach fasting which is purely cold. These things are better given, if need require, either at five in the afternoon, or else an hour after a light breakfast.

Often fastings are bad for long life; besides, all thirst is to be avoided, and the stomach is to be kept clean, but always moist.

Oil of *Olives* new and good, in which a little *Mirbridate* hath been dissolved, anointed upon the back-bone, just against the mouth of the stomach, doth wonderfully comfort the stomach.

A small bag filled with locks of Scarlet-wool steeped in Red-wine, in which

Myrtle,

Myrtle, and *Citron-pill*, and a little *Saffron* have been infused; may be always worn upon the stomach. And touching those things which comfort the stomach thus much, seeing many of those things also which serve for other operations are helpful to this.

The *Liver*, if it be preserved from *Torrefaction*, or *Desiccation*, and from *Obstruction*, it needeth no more; for that looseness of it which begets *Agnosities* is plainly a disease, but the other two old age approaching induceth.

Hereunto appertain most especially those things which are set down in the *Operation upon the Blood*: we will adde a very few things more, but those selected.

Principally let there be in use the Wine of sweet *Pomegranats*, or, if that cannot be had, the juice of them newly expressed; let it be taken in the morning with a little *Sugar*, and into the glass into which the Expression is made put a small piece of *Citron-pill* green, and three or four whole *Cloves*: let this be taken from *February* till the end of *April*.

Bring also into use above all other Herbs *Water-cresses*, but young, not old; they may be used either raw in *Sallets*, or in *Broths*, or in *Drinks*: and after that take *Spoken wort*.

Aloes, howsoever washed or corrected, is hurtful for the *Liver*, and therefore it is never to be taken ordinarily. Contrariwise, *Rhubarb* is sovereign for the *Liver*, so that these three cautions be interposed. First, that it be taken before meat, lest it dry the body too much, or leave some impressions of the *Stipticity* thereof. Secondly, that it be macerated an hour or two in Oil of sweet *Almonds* new drawn, with *Rose-water*, before it be infused in *Liquor*, or given in the proper substance. Thirdly, that it be taken by turns, one while simple, another while with *Tartar*, or a little *Bay-salt*, that it carry not away the lighter parts onely, and make the mass of the *Humors* more obstinate.

I allow *Wine*, or some decoction with *Steel*, to be taken three or four times in the year, to open the more strong obstructions; yet so, that a draught of two or three Spoonfuls of Oil of sweet *Almonds* new drawn ever go before, and the motion of the Body, especially of the arms and sides, constantly follow.

Sweetened Liquors, and that with some fatness, are principally, and not a little effectual to prevent the *Arefaction*, and *Saliness*, and *Torrefaction*, and, in a word, the *Oldness* of the *Liver*, especially if they be well incorporated with age. They are made of sweet Fruits and Roots, as namely, the Wines and Julips of *Raisins* of the *Sun* new, *Jujubas*, dried *Figs*, *Dates*, *Parsnips*, *Potatoes*, and the like, with the mixture of *Licoris* sometimes also a Julip of the *Indian* grain, (which they call *Maiz*) with the mixture of some sweet things, doth much to the same end. But it is to be noted, that the intention of preserving the *Liver* in a kind of softness and fatness, is much more powerful then that other which pertains to the opening of the *Liver*, which rather tendeth to health then to length of life, saving that that *Obstruction*, which induceth *Torrefaction* is as opposite to long life as those other *Arefactions*.

I commend the Roots of *Succory*, *Spinage* and *Beets* cleared of their piths, and boiled till they be tender in *Water*, with a third part of *White-wine*, for ordinary *Sallets*, to be eaten with Oil and *Vinegar*: also *Asparagus*, pith of *Artichokes*, and *Burre-roots* boiled and served up after the same manner; also *Broths* in the Spring-time of *Vine-buds*, and the green blades of *Wheat*. And touching the preserving of the *Liver* thus much.

The *Heart* receiveth benefit or harm most from the *Air* which we breath, from *Vapours*, and from the *Affections*. Now many of those things which have been formerly spoken touching the *Spirits* may be transferred hither; but that indigested mass of *Cordials* collected by *Physicians* avails little to our intention; notwithstanding those things which are found to be good against *Poisons* may with good judgment be given to strengthen and fortifie the *Heart*, especially if they be of that kind, that they do not so much resist the particular *poisons* as arm the heart and *Spirits* against poison in general. And touching the several *Cordials*, you may repair to the *Table* already set down.

The goodness of the *Air* is better known by experience then by signs. We hold that *Air* to be best where the Country is level and plain, and that lieth open on all sides, so that the soil be dry, and yet not barren or sandy; which puts forth

Wild Thyme, and *Eye-bright*, and a kind of *Marjoram*, and here and there stalks of *Calamint*, which is not altogether void of wood, but conveniently set with some Trees for shade; where the *Sweet-briar-rose* smelleth something Musky and Aromatically. If there be *Rivers*, we suppose them rather hurtful then good, unless they be very small, and clear, and gravelly.

It is certain that the *morning air* is more lively and refreshing then the *evening air*, though the latter be preferred out of delicacy.

We conceive also, that the *air stirred* with a *gentle wind* is more wholesome then the *air* of a *serene* and *calm skie*; but the best is, the *wind blowing* from the *West* in the morning, and from the *North* in the afternoon.

Odours are especially profitable for the comforting of the *heart*, yet not so as though a good *odour* were the prerogative of a good *air*: for it is certain, that as there are some *Pestilential airs* which smell not so ill as others, that are less hurtful; so, on the contrary, there are some *airs* most wholesome and friendly to the *spirits*, which either smell not at all, or are less pleasing and fragrant to the sense. And generally, where the *air* is good, *odours* should be taken but now and then: for a continual *odour*, though never so good, is burthenfom to the *spirits*.

We commend above all others (as we have touched before) *odour* of *Plants* growing, and not *plucked*, taken in the open *air*: the principal of that kind are *Violets*, *Gillies flowers*, *Pinks*, *Bean-flowers*, *Lime-tree-blossoms*, *Vine-buds*, *Hony-suckles*, *yellow Wall-flowers*, *Mask-Roses*, (for other *Roses* growing are fast of their smells) *Strawberry-leaves*, especially *dying*, *Sweet-briar*, principally in the early Spring, *wild Mint*, *Lavender* flowered; and in the hotter Countries, *Orange-tree*, *Citron-tree*, *Myrtle*, *Lavender*: Therefore to walk or sit near the breath of these *Plants* would not be neglected.

For the comforting of the *Heart*, we prefer cool smells before hot smells: therefore the best perfume is, either in the morning, or about the heat of the day, to take an equal portion of *Vinegar*, *Rose-water*, and *Claret-wine*, and to pour them upon a *Firepan* somewhat heated.

Neither let us be thought to sacrifice to our Mother the *Earth*, though we advise, that in *digging* or *ploughing* the *Earth* for health, a quantity of *Claret-wine* be poured thereon.

Orange-flower water, pure and good, with a small portion of *Rose-water* and *brisk Wine*, insuffled up into the nostrils, or put up into the nostrils with a *Syringe*, after the manner of an *Errhine*, (but not too frequently) is very good.

But *champing* (though we have no *Betel*) or holding in the mouth onely of such things as cheer the *Spirits*, (even daily done) is exceeding comfortable. Therefore for that purpose make *Grains* or little *Cakes* of *Amber-griece*, *Musk*, *Lignum-Aloes*, *Lignum Rhodium*, *Orras Powder*, and *Roses*; and let those *Grains* or *Cakes* be made up with *Rose-water* which hath passed through a little *Indian Balsam*.

The *Vapours* which arising from things inwardly taken do fortifie and cherish the *heart* ought to have these three properties, that they be *Friendly*, *Clear*, and *Cooling*; for hot *vapours* are naught, and *Wine* it self, which is thought to have onely an heating *vapour*, is not altogether void of an *Opiate quality*. Now we call those *vapours* *Clear* which have more of the *vapour* then of the *exhalation*, and which are not smoaky, or fuliginous, or unctuous, but moist and equal.

Out of that unprofitable rabble of *Cordials*, a few ought to be taken into daily diet: instead of all, *Amber-griece*, *Saffron*, and the grain of *Kermes*, of the hotter sort; *Roots* of *Bugloss* and *Borrage*, *Citrons*, *Sweet Limons*, and *Pearmains*, of the colder sort. Also that way which we said, both *Gold* and *Pearls* work a good effect, not onely within the veins, but in their passage, and about the parts near the heart; namely, by cooling, without any malignant quality.

Of *Beccar-stone* we believe well, because of many trials: but then the manner of taking it ought to be such, as the virtue thereof may more easily be communicated to the *spirits*: therefore we approve not the taking of it in *Broths* or *Syrups*, or in *Rose-water*, or any such like; but onely in *Wine*, *Cinnamon-water*, or the like distilled water, but that weak or small, not burning or strong.

Of the *Affections* we have spoken before, we onely adde this, That every *Noble*, and *Resolute*, and (as they call it) *Herculean Desire*, strengthneth and enlargeth the powers of the *Heart*. And touching the *Heart* thus much.

As for the *Brain*, where the *Seat* and *Court* of the *Animal spirits* is kept, those things which were inquired before touching *Opium*, and *Nitre*, and the *Subordinates* to them both, also touching the *procuring* of *placid sleep*, may likewise be referred hither. This also is most certain, that the *Brain* is in some sort in the custody of the *Stomach*; and therefore those things which comfort and strengthen the *Stomach* do help the *Brain* by consent, and may no less be transferred hither. We will adde a few *Observations*, three *Outward*, one *Inward*.

We would have *bathing* of the *Feet* to be often used, at least once in the week; and the *Bath* to be made of *Lye* with *Bay-salt*, and a little *Sage*, *Chamomile*, *Fennel*, *Sweet-marjoram*, and *Pepper-wort*, with the leaves of *Angelica* green.

We commend also a *Fume* or *Suffumigation* every morning of dried *Rosemary*, *Bay-leaves* dried, and *Lignum-Aloes*: for all sweet *Gums* oppress the head.

Especially care must be taken that no *hot things* be applied to the *Head* outwardly; such are all kind of *Spices*, the very *Nutmeg* not excepted: for those *hot things* we debase them to the soles of the *Feet*, and would have them applied there onely; but a light anointing of the *Head* with *Oil*, mixed with *Roses*, *Myrtle*, and a little *Salt* and *Saffron*, we much commend.

Not forgetting those things which we have before delivered touching *Opiates*, *Nitre*, and the like, which so much condense the *spirits*; we think it not impertinent to that effect, that once in fourteen days *Broth* be taken in the morning with three or four grains of *Cassoreum*, and a little *Angelica-seed*, and *Calamus*, which both fortify the *Brain*, and in that aforesaid density of the substance of the *spirits*, (so necessary to long life) adde also a *vivacity* of *motion* and *vigour* to them.

In handling the *Comforters* of the four principal *Bowels*, we have propounded those things which are both proper and choice, and may safely and conveniently be transferred into *Diets* and *Regiment of Life*: for variety of *Medicines* is the *Daughter* of *Ignorance*; and it is not more true, that many *Dishes* have caused many *Diseases*, as the *Proverb* is, then this is true, that many *Medicines* have caused few *Cures*. And touching the *Operation* upon the principal *Bowels* for their *Extrusion* of *Aliment*, thus much.



The Operation upon the outward Parts for their Attraction of Aliment. 6.

The History.

Although a good *Concoction* performed by the *Inward Parts* be the principal towards a perfect *Alimentation*; yet the *Actions* of the *Outward Parts* ought also to concur; that like as the *Inward Faculty* sendeth forth and extrudeth the *Aliment*; so the *Faculty* of the *Outward Parts* may call forth and attract the same: and the more weak the *Faculty* of *Concoction* shall be, the more need is there of a concurring help of the *Attractive Faculty*.

A strong *Attraction* of the *outward parts* is chiefly caused by the motion of the *Body*, by which the parts being heated and comforted, do more cheerfully call forth and attract the *Aliment* unto themselves.

But this is most of all to be foreseen and avoided, that the same motion and heat which calls the new juice to the members, doth not again despoil the member of that juice wherewith it had been before refreshed.

Frications used in the morning serve especially to this *Intention*: but this must evermore accompany them, that after the *Frication* the part be lightly anointed with *Oil*, lest the *Attrition* of the *outward parts* make them by *Perspiration* dry and juiceless.

The next is *Exercise*, (by which the parts confiticate and chafe themselves) so it

be moderate, and which (as was noted before) is not swift, nor to the utmost strength, nor unto weariness. But in *Exercise* and *Frication* there is the same reason and caution, that the body may not perspire or exhale too much: Therefore *Exercise* is better in the open air than in the house, and better in Winter than in Summer: and again, *Exercise* is not onely to be concluded with *Unction*, as *Frication* is, but in vehement *Exercises* *Unction* is to be used both in the beginning and in the end, as it was anciently to *Champions*.

That *Exercise* may resolve either the spirits or the juices as little as may be, it is necessary that it be used when the stomach is not altogether empty: and therefore that it may not be used upon a full stomach, (which doth much concern health) nor yet upon an empty stomach, (which doth no less concern long life) it is best to take a breakfast in the morning, not of any Physical Drugs, or of any Liquors, or of Raisins, or of Figs, or the like; but of plain Meat and Drink, yet that very light, and in moderate quantity.

Exercises used for the irrigation of the members ought to be equal to all the members; not (as *Socrates* said) that the Legs should move, and the Arms should rest, or on the contrary; but that all the parts may participate of the motion. And it is altogether requisite to long life, that the Body should never abide long in one posture, but that every half hour, at least, it change the posture, saving onely in sleep.

Those things which are used to *Mortification*, may be transferred to *Vivification*; for both Hair-shirts, and Scourgings, and all vexations of the outward parts, do fortifie the Attractive force of them.

Cardan commends *Nettling*, even to let out *Melancholy*: but of this we have no experience; and besides, we have no good opinion of it, lest, through the venomous quality of the *Nettle*, it may with often use breed Itches and other diseases of the skin. And touching the Operation upon the Outward Parts for their Attraction of Aliment, thus much.



The Operation upon the Aliment it self for the Insinuation thereof. 7.

The History.

THE vulgar reproof touching many Dishes doth rather become a severe Reformer than a Physician; or howsoever it may be good for preservation of health, yet it is hurtful to length of life, by reason that a various mixture of Aliments, and somewhat heterogeneous, finds a passage into the veins and juices of the body more lively and chearfully than a simple and homogeneous diet doth; besides, it is more forcible to stir up Appetite, which is the spur of Digestion. Therefore we allow both a full Table, and a continual changing of Dishes, according to the Seasons of the year, or upon other occasions.

Also that opinion of the Simplicity of Meats without Sawces is but a simplicity of judgment; for good and well-chosen Sawces are the most wholesome preparation of Meats, and conduce both to health and to long life.

It must be ordered, that with Meats hard of digestion be conjoynd strong Liquors and Sawces that may penetrate and make way; but with Meats more easie of digestion, smaller Liquors and far Sawces.

Whereas we advised before, that the first Draught at Supper should be taken warm; now we adde, that for the preparation of the stomach, a good draught of that Liquor (to which every man is most accustomed) be taken warm half an hour before meat also, but a little spiced, to please the taste.

The preparation of Meats, and Bread, and Drinks, that they may be rightly handled, and in order to this Intention, is of exceeding great moment: howsoever it may seem a Mechanical thing, and favouring of the Kitchen and Buttery; yet it is of more consequence than those Fables of Gold and precious Stones, and the like.

The moistning of the juices of the body by a moist preparation of the aliments, is a childish thing; it may be somewhat available against the fervours of diseases, but it is altogether averse to roscid alimentation. Therefore boiling of meats, as concerning our Intention, is far inferiour to roasting, and baking, and the like.

Roasting ought to be with a quick fire, and soon dispatched; not with a dull fire, and in long time.

All solid fleshes ought to be served in, not altogether fresh, but somewhat powdered or corned; the less Salt may be spent at the table with them, or none at all: for Salt incorporated with the meat before is better distributed in the body, then eaten with it at the table.

There would be brought into use several and good *Macerations*, and *Infusions* of Meats in convenient Liquors, before the roasting of them: the like whereof are sometime in use before they bake them, and in the Pickles of some Fishes.

But *beatings*, and as it were *scurgings*, of flesh-meats before they be boiled, would work no small matter. We see it is confessed that *Partridges* and *Pheasants* killed with an *Hawk*, also *Bucks* and *Stags* killed in *Hunting*, (if they stand not out too long eat better even to the taste, and some *Fishes* scourged and beaten, become more tender and wholesome; also hard and sour *Pears*, and some other Fruits, grow sweet with rowling them. It were good to practise some such beating and bruising of the harder kinds of Fleshes before they be brought to the fire; and this would be one of the best preparations of all.

Bread a little leavened, and very little salted, is best, and which is baked in an Oven thoroughly heated, and not with a faint heat.

The preparation of Drinks in order to long life shall not exceed one Precept. And as touching *Water-drinkers* we have nothing to say; such a diet (as we said before) may prolong life to an indifferent term, but to no eminent length: but in other Drinks, that are full of spirit, (such as are *Wine*, *Ale*, *Mead*, and the like) this one thing is to be observed and pursued, as the sum of all, That the parts of the *Liquor* may be exceeding thin and subtil, and the *Spirit* exceeding mild. This is hard to be done by *Age* alone, for that makes the parts a little more subtil, but the spirits much more sharp and eager: therefore of the *Infusions* in the Vessels of some far substance, which may restrain the acrimony of the spirits, counsel hath been given before. There is also another way without *Infusion* or *Mixture*: this is, that the *Liquor* might be continually agitated, either by carriage upon the *Water*, or by carriage by *Land*, or by hanging the vessels upon lines, and daily stirring them, or some such other way: for it is certain that this *local motion* doth both subtilize the parts, and doth so incorporate and compact the spirits with the parts, that they have no leisure to turn to sowness, which is a kind of *putrefaction*.

But in extreme *old age* such a preparation of meats is to be made as may be almost in the middle way to *Chylus*. And touching the *Distillations* of Meats, they are mere toys; for the *Nutritive part*, at least the best of it, doth not ascend in *Vapours*.

The incorporating of meat and drink before they meet in the stomach is a degree to *Chylus*: therefore let *Chickens*, or *Partridges*, or *Pheasants*, or the like, be taken and boiled in water with a little salt, then let them be cleansed and dried, afterward let them be infused in *Must* or *Ale* before it hath done working, with a little *Sugar*.

Also *Grazies* of meat, and the mincings of them small well season'd, are good for *old persons*; and the rather, for that they are destitute of the office of their *Teeth* in chewing, which is a principal kind of preparation.

And as for the helps of that defect, (namely, of the strength of *Teeth* to grind the meat) there are three things which may conduce thereunto. First, that new *Teeth* may put forth; that which seems altogether difficult, and cannot be accomplished without an inward and powerful restauration of the body. Secondly, that the *Jaws* be so confirmed by due *Astringents*, that they may in some sort supply the office of the *Teeth*; which may possibly be effected. Thirdly, that the meat be so prepared, that there shall be no need of chewing: which remedy is ready and at hand.

We have some thought also touching the *Quantity* of the meat and drink, that the same taken in larger quantity at some times is good for the *irrigation* of the body; therefore both *great Feasting*s and *free Drinking*s are not altogether to be inhibited. And touching the *Operation* upon the *Aliments* and the *Preparation* of them, thus much.

The Operation upon the last Act of Assimilation. 8.

Touching the last Act of Assimilation (unto which the three Operations immediately preceding chiefly tend,) our advice shall be brief and single: and the thing it self rather needs Explication, then any various Rules.

It is certain that all bodies are endued with some desire of *Assimilating* those things which are next them. This the rare and pneumatical bodies, as *Flame*, *Spirit*, *Air*, perform generously and with alacrity: on the contrary, those that carry a gross and tangible bulk about them, do but weakly, in regard that the desire of *assimilating* other things is bound in by a stronger desire of *Rest*, and containing themselves from *Motion*.

Again, it is certain that desire of *assimilating* being bound, as we said, in a Gross body, and made uneffectual, is somewhat freed and stirred up by the heat and neighbouring *Spirit*, so that it is then actuated: which is the onely cause why *In-animates assimilate not*, and *Animates assimilate*.

This also is certain, that the harder the Consistence of the body is, the more doth that body stand in need of a greater heat to prick forward the *assimilation*: which falls out ill for old men, because in them the parts are more obstinate, and the heat weaker; and therefore either the obstinacy of their parts is to be softened, or their heat increased. And as touching the *Malacissation* or *mollifying* of the members, we shall speak afterward, having also formerly propounded many things which pertain to the prohibiting and preventing of this kind of hardness. For the other, touching the increasing of the heat, we will now deliver a single precept, after we have first assumed this *Axiom*.

The Act of *Assimilation* (which, as we said, is excited by the heat circumsfused) is a motion exceeding accurate, subtil, and in little; now all such motions do then come to their vigour, when the *local Motion* wholly ceaseth which disturbeth it. For the *Motion* of *Separation* into *homogeneous* parts, which is in Milk, that the Cream should swim above, and the Whey sink to the bottom, will never work, if the Milk be never so little agitated; neither will any *Putrefaction* proceed in Water or mixt Bodies, if the same be in continual *Local Motion*. So then, from this *Assumption* we will conclude this for the present Inquisition.

The Act it self of *Assimilation* is chiefly accomplished in Sleep and Rest, especially towards the morning, the distribution being finished. Therefore we have nothing else to advise, but that men keep themselves hot in their sleep; and further, that towards the morning there be used some Anointing, or shirt tinged with Oil, such as may gently stir up heat, and after that to fall asleep again. And touching the last Act of *Assimilation* thus much.



The Operation upon the Inteneration of that which begins to be Arefied, or the Malacissation of the Body. 9.

WE have inquired formerly touching the Inteneration from within, which is done by many Windings and Circuits, as well of Alimentation as of Detaining the Spirit from issuing forth, and therefore is accomplished slowly. Now we are to inquire touching that Inteneration which is from without, and is effected, as it were, suddenly; or touching the Malacissation and Suppling of the Body.

The History.

IN the Fable of restoring Pelias to youth again, Medea, when she feigned to doe it, propounded this way of accomplishing the same, That the Old man's body should be cut into several pieces, and then boiled in a Cauldron with certain Medicaments. There may, perhaps, some boiling be required to this matter, but the cutting into pieces is not needful.

Notwithstanding, this cutting into pieces seems, in some sort, to be useful; not with a knife, but with judgment. For whereas the Consistence of the *Bowels* and *Parts* is very diverse, it is needful that the *Inteneration* of them both be not effected the same way, but that there be a Cure designed of each in particular, besides those things which pertain to the Inteneration of the whole mass of the Body; of which, notwithstanding, in the first place.

This *Operation* (if perhaps it be within our power) is most likely to be done by Baths, Unctions, and the like; concerning which these things that follow are to be observed.

We must not be too forward in hoping to accomplish this matter from the Examples of those things which we see done in the *Imbibitions* and *Macerations* of *Inanimates*, by which they are intenerated, whereof we introduced some instances before: For this kind of operation is more easie upon *Inanimates*, because they attract and suck in the Liquor; but upon the bodies of Living creatures it is harder, because in them the motion rather tendeth outward and to the *Circumference*.

Therefore the *Emollient Baths* which are in use doe little good, but on the contrary hurt, because they rather draw forth then make entrance, and resolve the structure of the body rather then consolidate it.

The *Baths* and *Unctions* which may serve to the present *Operation* (namely, of *Intenerating* the body truly and really) ought to have three properties.

The first and principal is, That they consist of those things which in their whole substance are like unto the *body* and *flesh* of *man*, and which have a *feeding* and *nursing* virtue from without.

The second is, That they be mixed with such things as through the *subtlety* of their parts may make entrance, and so insinuate and convey their *nourishing* virtue into the body.

The third is, That they receive some mixture (though much inferiour to the rest) of such things as are *Astringent*; I mean not sour or tart things, but unctuous and comforting; that while the other two do operate, the exhaling out of the body, which destroyeth the virtue of the things *intenerating*, may (as much as is possible) be prohibited; and the motion to the inward parts, by the *Astriction* of the skin and closing of the passages, may be promoted and furthered.

That which is most *consustantial* to the body of man is *warm Blood*, either of man, or of some other living creature: but the device of *Ficinus*, touching the sucking of blood out of the arm of a wholesome young man; for the restauration of strength in old men, is very frivolous; for that which nourisheth from within ought no way to be equal or homogeneal to the body nourished; but in some sort inferiour and subordinate; that it may be converted: but in things applied outwardly, by how much the substance is liker, by so much the consent is better.

It hath been anciently received, that a Bath made of the blood of Infants will cure the *Leprosie*, and heal the flesh already putrefied; insomuch that this thing hath begot envy towards some Kings from the common people.

It is reported that *Heraclitus*, for cure of the *Dropsie*, was put into the warm belly of an Ox newly slain.

They use the blood of Kittens warm to cure the disease called *St. Anthony's Fire*, and to restore the flesh and skin.

An Arm, or other Member newly cut off, or that upon some other occasion will not leave bleeding, is with good success pur into the belly of some creature newly ripped up, for it worketh potently to stanch the blood; the blood of the member cut off by consent sucking in, and vehemently drawing to it self, the warm blood of the creature slain, whereby it self is stopped and retireth.

It is much used in extreme and desperate diseases to cut in two young Pigeons, yet living, and apply them to the soles of the feet, and to shift them one after another, whereby sometime there followeth a wonderful ease. This is imputed vulgarly as if they should draw down the malignity of the disease; but howsoever, this application goeth to the Head, and comforteth the Animal Spirits.

But these bloody Baths and Unctions seem to us sluttish and odious: let us search out some others, which perhaps have less loathsomeness in them, and yet no less benefit.

Next unto warm Blood, things alike in substance to the Body of a man are nutritives: fat fleshes of Oxen, Swine, Dear; Oysters amongst Fishes; Milk, Butter, Yolks of Eggs, Flower of Wheat, sweet Wine, either Sugred, or before it be fined.

Such things as we would have mixed to make impression are, instead of all, Salts, especially Bay-salt; also Wine (when it is full of Spirit) maketh entrance, and is an excellent Convoy.

Astringents of that kind which we described, namely, unctuous and comfortable things, are Saffron, Mastick, Myrrhe, and Myrtle-berries.

Of these parts, in our judgment, may very well be made such a Bath as we design: Physicians and Posterity will find out better things hereafter.

But the Operation will be much better and more powerful, if such a Bath as we have propounded (which we hold to be the principal matter) be attended with a four-fold Course and Order.

First, that there go before the Bath a Friction of the body, and an Anointing with Oil, with some thickning substance, that the virtue and moistning heat of the Bath may pierce the body, and not the watry part of the Liquor. Then let the Bath follow, for the space of some two hours. After the Bath, let the body be Emplaistred with Mastick, Myrrhe, Tragacanth, Diapalma, and Saffron; that the perspiration of the body may (as much as is possible) be inhibited, till the supple matter be by degrees turned into solid: This to be continued for the space of twenty four hours or more. Lastly, the Emplaistring being removed, let there be an anointing with Oil mixed with Salt and Saffron. And let this Bath, together with the Emplaistring and Uction, (as before) be renewed every fifth day. This Malacissation or suppling of the body to be continued for one whole month.

Also during the time of this Malacissation, we hold it useful and proper, and according to our intention, that men nourish their bodies well, and keep out of the cold air, and drink nothing but warm drink.

Now this is one of those things (as we warned in general in the beginning) whereof we have made no trial by Experiment, but onely set it down out of our aiming and levelling at the end: For having set up the Mark, we deliver the Light to others.

Neither ought the warmth and cherishings of living bodies to be neglected. Ficinus saith, and that seriously enough, That the laying of the young Maid in David's bosom was wholesome for him, but it came too late. He should also have added, That the young Maid, after the manner of the Persian Virgins, ought to have been anointed with Myrrhe, and such like, not for deliciousness, but to increase the virtue of this cherishing by a living body.

Barbarossa, in his extreme old age, by the advice of a Physician, a Jew, did continually apply young Boys to his stomach and belly, for warmth and cherishing: also some old men lay Whelps (creatures of the hottest kind) close to their stomachs every night.

There hath gone a report, almost undoubted, and that under several names, of certain men that had great Noses, who being weary of the derision of people have cut off the bunches or billocks of their Noses, and then making a wide gash in their arms, have held their Noses in the place for a certain time, and so brought forth fair and comely Noses: which if it be true, it shews plainly the consent of flesh unto flesh, especially in live fleshes.

Touching the particular Inteneration of the principal Bowels, the Stomach, Lungs, Liver, Heart, Brain, Marrow of the Back-bone, Guts, Reins, Gall, Veins, Arteries, Nerves, Cartilages, Bones, the Inquisition and Direction would be too long, seeing we now set not forth a Practick, but certain Indications to the Practick.

The Operation upon the Purging away of old Juice, and Supplying of new Juice; or of Renovation by Turns. 10.

The History.

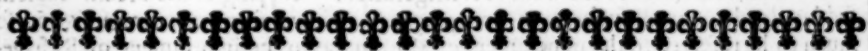
ALthough those things which we shall here set down have been, for the most part, spoken of before; yet because this Operation is one of the principal, we will handle them over again more at large.

It is certain that *Draught-oxen* which have been worn out with working, being put into fresh and rich pastures, will gather tender and young flesh again: and this will appear even to the taste and palat; so that the *Inteneration* of flesh is no hard matter. Now it is likely that this *Inteneration* of the flesh being often repeated, will in time reach to the *Inteneration* of the *Bones* and *Membranes*, and like parts of the body.

It is certain that Diets which are now much in use, principally of *Guaiacum*, and of *Sarsaparilla*, *China*, and *Sassafras*, if they be continued for any time, and according to strict rules, do first *attenuate* the whole juice of the body, and after consume it and drink it up. Which is most manifest, because that by these Diets the *French-Pox*, when it is grown even to an hardness, and hath eaten up and corrupted the very marrow of the body, may be assuredly cured. And further, because it is as manifest that men who by these diets are brought to be extreme lean, pale, and as it were ghosts, will soon after become fat, well-coloured, and apparently young again. Wherefore we are absolutely of opinion, that such kind of diets in the decline of age, being used every year, would be very useful to our Intention; like the old skin or spoil of *Serpents*.

We do confidently affirm, (neither let any man reckon us among those *Hereticks* which were called *Cathari*) that often *Purges*, and made even familiar to the body, are more available to long life than *Exercises* and *Sweats*: and this must needs be so, if that be held, which is already laid for a ground, That *Unctions* of the body, and *Oppletion* of the passages from without, and *Exclusion* of air, and *Detaining* of the spirit within the mass of the body, do much conduce to long life. For it is most certain, that by *Sweats* and outward *Perspirations* not onely the *Humors* and excrementitious vapours are exhaled and consumed, but together with them the juices also and good spirits, which are not so easily repaired: but in *Purges* (unless they be very immoderate) it is not so, seeing they work principally upon the *Humors*. But the best *Purges* for this Intention are those which are taken immediately before meat, because they dry the body less; and therefore they must be of those *Purgers* which do least trouble the belly.

These Intentions of the Operations which we have propounded (as we conceive) are most true, the Remedies faithful to the Intentions. Neither is it credible to be told (although not a few of these Remedies may seem but vulgar) with what care and choice they have been examined by us, that they might be (the Intention not at all impeached) both safe and effectual. Experience, no doubt, will both verifie and promote these matters. And such, in all things, are the works of every prudent counsel, that they are Admirable in their Effects, Excellent also in their Order, but seeming Vulgar in the Way and Means.



The Porches of Death.

WE are now to enquire touching the Porches of Death, that is, touching those things which happen unto men at the point of Death, both a little before and after; that seeing there are many Paths which lead to Death, it may be understood in what Common way

way they all end, especially in those Deaths which are caused by Indigence of Nature rather than by Violence: although something of this latter also must be inserted, because of the connexion of things.

The History.

THE living Spirit stands in need of three things that it may subsist; *Convenient Motion, Temperate Refrigeration, and Fit Aliment.* Flame seems to stand in need but of two of these, namely, *Motion* and *Aliment*; because Flame is a simple substance, the Spirit a compounded, inasmuch that if it approach somewhat too near to a flamy nature, it overthroweth it self.

Also Flame by a greater and stronger Flame is extinguished and slain, as *Aristotle* well noted, much more the *Spirit*.

Flame, if it be much compressed and streightned, is extinguished: as we may see in a Candle having a Glas cast over it; for the Air being dilated by the heat, doth con-
trude and thrust together the Flame, and so lesseneth it, and in the end extinguish-
eth it; and fires on hearths will not flame if the fuel be thrust close together without
any space for the flame to break forth.

Also things fired are extinguished with compression; as if you press a burning coal
hard with the Tongs or the foot, it is straight extinguished.

But to come to the Spirit: If Bloud or Phlegm get into the Ventricles of the
Brain, it causeth sudden death, because the Spirit hath no room to move it
self.

Also a great blow on the Head induceth sudden death, the Spirits being streightned
within the Ventricles of the Brain.

Opium and other strong *Stupefactives* do coagulate the Spirit, and deprive it of
the motion.

A *venomous Vapour*, totally abhorred by the spirit, causeth sudden death: as in
deadly poisons, which work (as they call it) by a specifical malignity; for they
strike a loathing into the spirit, that the spirit will no more move it self, nor rise
against a thing so much detested.

Also extreme Drunkenness or extreme Feeding sometime cause sudden death,
seeing the spirit is not onely oppressed with over-much *condensing*, or the malignity of
the vapour, (as in *Opium* and malignant poisons) but also with the abundance of the
Vapours.

Extreme Grief or Fear, especially if they be sudden, (as it is in a sad and unexpe-
cted message) cause sudden death.

Not onely over-much Compression, but also over-much Dilatation of the spirit, is
deadly.

Joys excessive and sudden have bereft many of their lives.

In greater Evacuations, as when they cut men for the *Dropse*, the waters flow forth
abundantly; much more in great and sudden fluxes of bloud oftentimes present
death followeth: and this happens by the mere sight of *Vacuum* within the body,
all the parts moving to fill the empty places, and amongst the rest the spirits
themselves. For as for slow fluxes of bloud, this matter pertains to the indigence
of nourishment, not to the diffusion of the spirits. And touching the motion
of the spirit so far, either compressed or diffused, that it bringeth death, thus
much.

We must come next to the want of Refrigeration. Stopping of the breath causeth
sudden death, as in all suffocation or strangling. Now it seems this matter is not so
much to be referred to the impediment of Motion, as to the impediment of Refrige-
ration; for air over-hot, though attracted freely, doth no less suffocate then if
breathing were hindred; as it is in them who have been sometime suffocated with
burning coals, or with char-coal, or with walls newly plaistered in close chambers
where a fire is made: which kind of death is reported to have been the end of the
Emperor *Jovinian*. The like happeneth from dry Baths over-heated, which was pra-
ctised in the killing of *Pamela*, wife to *Constantine* the Great.

It is a very small time which Nature taketh to repeat the breathing, and in
which

which she desireth to expel the foggy air drawn into the *Lungs*, and to take in new, scarce the third part of a minute.

Again, the beating of the *Pulse*, and the motion of the *Systole* and *Diastole* of the heart, are three times quicker than that of breathing; inasmuch that if it were possible that that motion of the heart could be stopped without stopping the breath, death would follow more speedily thereupon than by strangling.

Notwithstanding, use and custom prevail much in this natural action of breathing; as it is in the *Delian Divers* and *Fishers for Pearl*, who by long use can hold their breaths at least tentimes longer than other men can do.

Amongst living *Creatures*, even of those that have *Lungs*, there are some that are able to hold their breaths a long time, and others that cannot hold them so long, according as they need more or less refrigeration.

Fishes need less refrigeration than *Terrestrial Creatures*, yet some they need, and take it by their *Gills*. And as *Terrestrial Creatures* cannot bear the air that is too hot or too close; so *Fishes* are suffocated in waters if they be totally and long frozen.

If the Spirit be assaulted by another heat greater than it self, it is dissipated and destroyed; for it cannot bear the proper heat without refrigeration, much less can it bear another heat which is far stronger. This is to be seen in *burning-Fevers*, where the heat of the putrefied humours doth exceed the native heat, even to extinction or dissipation.

The want also and use of *Sleep* is referred to *Refrigeration*. For Motion doth attenuate and rarify the spirit, and doth sharpen and increase the heat thereof; contrarily, *Sleep* setteth and restraineth the motion and gadding of the same: for though *Sleep* doth strengthen and advance the actions of the parts and of the lively spirits, and all that motion which is to the circumference of the body; yet it doth in great part quiet and still the proper motion of the *living Spirit*. Now sleep regularly is due unto humane nature once within four and twenty-hours, and that for six or five hours at the least: though there are, even in this kind, sometimes miracles of Nature; as it is recorded of *Mecenas*, that he slept not for a long time before his death. And as touching the want of *Refrigeration* for conserving of the *Spirit*, thus much.

As concerning the third *Indigence*, namely, of *Aliment*, it seems to pertain rather to the parts than to the *living Spirit*, for a man may easily believe that the *living Spirit* subsisteth in Identity, not by succession or renovation. And as for the *reasonable Soul* in man, it is above all question that it is not engendred of the Soul of the Parents, nor is repaired; nor can die. They speak of the *Natural Spirit* of living Creatures, and also of *Vegetables*, which differs from that other Soul essentially and formally. For out of the confusion of these that same transmigration of Souls, and innumerable other devices of Heathens and Hereticks have proceeded.

The Body of man doth regularly require *Renovation* by *Aliment* every day, and a body in health can scarce endure fasting three days together; notwithstanding use and custom will doe much even in this case: but in sickness fasting is less grievous to the body. Also *Sleep* doth supply somewhat to nourishment; and on the other side *Exercise* doth require it more abundantly. Likewise there have some been found who sustained themselves (almost to a miracle in nature) a very long time without meat or drink.

Dead bodies, if they be not intercepted by putrefaction, will subsist a long time without any notable *Absumption*; but *Living bodies* not above three days, (as we said) unless they be repaired by nourishment: which sheweth that quick *Absumption* to be the work of the *living Spirit*, which either repairs it self, or puts the parts into a necessity of being repaired, or both. This is testified by that also which was noted a little before, namely, that *living creatures* may subsist somewhat the longer without *Aliment* if they sleep: now sleep is nothing else but a reception and retirement of the *living Spirit* into it self.

An abundant and continual effluxion of blood, which sometimes happeneth in the *Hemorrhoids*; sometimes in vomiting of blood, the inward Veins being unlocked or broken, sometimes by wounds, causeth sudden death, in regard that the blood of the *Veins* ministrerh to the *Arteries*, and the blood of the *Arteries* to the *Spirits*.

The quantity of meat and drink which a man, eating two meals a day, receiveth into his body is not small; much more then he voideth again either by stool, or by urine, or by sweating. You will say, No marvel, seeing the remainder goeth into the juices and substance of the body. It is true; but consider then that this addition is made twice a day, and yet the body aboundeth not much. In like manner, though the spirit be repaired, yet it grows not excessively in the quantity.

It doth no good to have the Aliment ready, in a degree removed, but to have it of that kind, and so prepared and supplied that the spirit may work upon it: for the staff of a Torch alone will not maintain the flame, unless it be fed with wax, neither can men live upon herbs alone. And from thence comes the *Inconcoction* of old age, that though there be flesh and blood, yet the spirit is become so penurious and thin, and the juices and blood so heartless and obstinate, that they hold no proportion to *Alimentation*.

Let us now cast up the *accounts* of the *Needs* and *Indigences*, according to the ordinary and usual course of nature. The Spirit hath need of opening and moving it self in the *Ventricles* of the Brain and Nerves even continually, of the motion of the *Heart* every third part of a moment, of breathing every moment, of sleep and nourishment once within three days, of the power of nourishment commonly till eighty years be past: And if any of these *Indigences* be neglected, *Death* ensueth. So there are plainly three *Porches* of *Death*; Destitution of the Spirit in the *Motion*, in the *Refrigeration*, in the *Aliment*.

It is an error to think that the Living Spirit is perpetually generated and extinguished, as Flame is, and abideth not any notable time: for even Flame it self is not thus out of its own proper nature, but because it liveth amongst enemies, for Flame within Flame endureth. Now the Living Spirit liveth amongst friends, and all due obsequiousness. So then, as Flame is a momentary substance, Air is a fixed substance, the Living Spirit is betwixt both.

Touching the extinguishing of the Spirit by the destruction of the Organs (which is caused by Diseases and Violence) we enquire not now, as we foretold in the beginning, although that also endeth in the same three Porches. And touching the Form of Death it it self thus much.

There are two great fore-runners of Death, the one sent from the Head, the other from the Heart; *Convulsion*, and the extreme labour of the *Pulse*; for, as for the deadly *Hicough*, it is a kind of *Convulsion*. But the deadly labour of the *Pulse* hath that unusual swiftness, because the Heart at the point of death doth so tremble, that the *Systole* and *Diastole* thereof are almost confounded. There is also conjoined in the *Pulse* a weakness and lowness; and oftentimes a great intermission, because the motion of the Heart faileth, and is not able to rise against the assault stoutly or constantly.

The immediate preceding signs of *Death* are, great unquietness and tossing in the bed, fumbling with the hands, catching and grasping hard, gnashing with the teeth, speaking hollow, trembling of the neather lip, paleness of the face, the memory confused, speechlessness, cold sweats, the body shooting in length, lifting up the white of the eye, changing of the whole visage, (as the nose sharp, eyes hollow, cheeks fallen) contraction and doubling of the coldness in the extreme parts of the body; in some, shedding of blood or sperm, shrieking, breathing thick and short, falling of the neather chap, and such like.

There follow Death a privation of all sense and motion; as well of the Heart and Arteries as of the Nerves and Joynts, an inability of the body to support it self upright, stiffness of the Nerves and parts, extreme coldness of the whole body; after a little while, putrefaction and stinking.

Eels, *Serpents* and the *Insecta* will move a long time in every part after they are cut asunder, insomuch that Country people think that the parts strive to join together again. Also *Birds* will flutter a great while after their heads are pulled off; and the hearts of living creatures will pant a long time after they are plucked out. I remember I have seen the heart of one that was bowelled, as suffering for High Treason, that being cast into the fire, leaped at the first at least a foot and half in height, and after by degrees lower and lower, for the space, as I remember, of seven or eight minutes. There is also an ancient and credible Tradition of an Ox lowing after his bowels were plucked out. But there is a more certain tradition of a man, who being under the

Executioner's hand for high Treason, after his *Heart* was plucked out and in the Executioner's hand, was heard to utter three or four words of prayer: which therefore we said to be more credible than that of the *Ox* in *Sacrifice*, because the friends of the party suffering do usually give a reward to the Executioner to dispatch his office with the more speed, that they may the sooner be rid of their pain; but in *Sacrifices* we see no cause why the Priest should be so speedy in his office.

For *reviving* those again which fall into sudden *Swooning* and *Catalepses* of *astonishments*, (in which Fits many, without present help, would utterly expire) these things are used: Putting into their mouths Water distilled of Wine, which they call *Hot-waters*, and *Cordial-waters*, bending the body forwards, stopping the mouth and nostrils hard, bending or wringing the fingers, pulling the hairs of the beard or head, rubbing of the parts, especially the face and legs, sudden casting of cold water upon the face, shrieking out aloud and suddenly; putting *Rose-water* to the nostrils with *Vinegar* in faintings; burning of Feathers or Cloth in the suffocation of the *Mother*: but especially a *Frying-pan* heated red-hot is good in *Apoplexies*; also a close embracing of the body hath helped some.

There have been many examples of men in shew dead, either laid out upon the cold floor, or carried forth to burial; nay, of some buried in the earth, which notwithstanding have lived again, which hath been found in those that were buried (the earth being afterwards opened) by the bruising and wounding of their head through the struggling of the body within the Coffin; whereof the most recent and memorable example was that of *Joannes Scotus*, called the *Snbril*, and a *School-man*, who being digged up again by his Servant, (unfortunately absent at his burial, and who knew his Master's manner in such fits) was found in that state: And the like happened in our days in the person of a Player, buried at *Cambridge*. I remember to have heard of a certain *Gentleman*, that would needs make trial in curiosity what men did feel that were hanged; so he fastned the Cord about his neck, raising himself upon a stool, and then letting himself fall, thinking it should be in his power to recover the stool at his pleasure, which he failed in, but was helped by a friend then present. He was asked afterward what he felt. He said he felt no pain, but first he thought he saw before his eyes a great fire and burning; then he thought he saw all black and dark; lastly it turned to a pale blew, or Sea-water green; which colour is also often seen by them which fall into *Swoonings*. I have heard also of a Physician, yet living, who recovered a man to life which had hanged himself, and had hanged half an hour, by *Frications* and hot *Baths*: And the same Physician did profess, that he made no doubt to recover any man that had hanged so long, so his Neck were not broken with the first swing.



The Differences of Youth and Old Age.

THE Ladder of Man's Body is this, To be conceived, to be quickned in the womb, to be born, to suck, to be weaned, to feed upon Pap, to put forth Teeth the first time about the second year of age, to begin to go, to begin to speak, to put forth Teeth the second time about seven years of age, to come to *Puberty* about twelve or fourteen years of age, to be able for generation and the flowing of the *Menstrua*, to have hairs about the legs and arm-holes, to put forth a Beard, and thus long, and sometimes later, to grow in stature, to come to full years of strength and agility, to grow gray and bald; the *Menstrua* ceasing, and ability to generation, to grow decrepit and a monster with three legs, to die. Mean-while the Mind also hath certain periods, but they cannot be described by years, as to decay in the *Memory*, and the like; of which hereafter.

The differences of *Youth* and *old Age* are these: A young man's skin is smooth and plain, an old man's dry and wrinkled, especially about the forehead and eyes; a young man's flesh is tender and soft, an old man's hard; a young man hath strength and agility, an old man feels decay in his strength and is slow of motion; a young man

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hath good digestion, an old man bad; a young man's bowels are soft and succulent, an old man's salt and parched; a young man's body is erect and straight, an old man's bowing and crooked; a young man's limbs are steady, an old man's weak and trembling; the humors in a young man are choleric, and his blood inclined to heat; in an old man phlegmatick and melancholick, and his blood inclined to coldness; a young man ready for the act of *Venus*, an old man slow unto it: in a young man the juices of his body are more roscid; in an old man more crude and waterish; the spirit in a young man plentiful and boiling, in an old man scarce and jejune: a young man's spirit is dense and vigorous, an old man's eager and rare; a young man hath his senses quick and entire, an old man dull and decayed; a young man's teeth are strong and entire, an old man's weak, worn, and falling out; a young man's hair is coloured, an old man's (of what colour soever it were) gray; a young man hath hair, an old man baldness; a young man's pulse is stronger and quicker, an old man's more confused and slower; the diseases of young men are more acute and curable, of old men longer and hard to cure; a young man's wounds soon close, an old man's later; a young man's cheeks are of a fresh colour, an old man's pale, or with a black blood; a young man is less troubled with rheums, an old man more. Neither do we know in what things old men do improve as touching their body, save onely sometime in fatness; whereof the reason is soon given, Because old men's bodies do neither perspire well, nor assimilate well: now Fatness is nothing else but an exuberance of nourishment above that which is voided by excrement, or which is perfectly assimilated. Also some old men improve in the appetite of feeding by reason of the *acid humors*; though old men digest worst. And all these things which we have said, *Physicians* negligently enough will refer to the *diminution* of the *Natural heat* and *Radical moisture*, which are things of no worth for use. This is certain, *Driness* in the coming on of years doth forego *Coldness*; and bodies when they come to the top and strength of heat do decline in *Driness*, and after that follows *Coldness*.

Now we are to consider the *Affections* of the *Mind*. I remember when I was a young man, at *Poitiers* in *France* I conversed familiarly with a certain *French-man*, a witty young man, but something talkative, who afterwards grew to be a very eminent man: he was wont to inveigh against the manners of *old men*, and would say, That if their Minds could be seen as their Bodies are, they would appear no less deformed. Besides, being in love with his own wit, he would maintain, That the vices of old men's Minds have some correspondence and were parallel to the putrefactions of their Bodies: For the driness of their skin he would bring in *Impudence*; for the hardness of their bowels, *Unmercifulness*; for the lippitude of their eyes, an *evil Eye* and *Envy*; for the casting down of their eyes, and bowing their body towards the earth, *Atheism*; (for, saith he, *they look no more up to Heaven as they were wont*) for the trembling of their members, *Irresolution* of their decrees and *light inconstancy*; for the bending of their fingers, as it were to catch, *Rapacity* and *Covetousness*; for the buckling of their knees, *Fearfulness*; for their wrinkles, *Craftiness* and *Obliquity*; and other things which I have forgotten. But to be serious, a young man is modest and shame-fac'd, an old man's fore-head is hardened; a young man is full of bounty and mercy, an old man's heart is brawny; a young man is affected with a laudable emulation, an old man with a malignant envy; a young man is inclined to Religion and Devotion, by reason of his fervency and inexperience of evil, an old man cooleth in piety through the coldness of his charity, and long conversation in evil, and likewise through the difficulty of his belief; a young man's desires are vehement, an old man's moderate; a young man is light and moveable, an old man more grave and constant; a young man is given to liberality, and beneficence, and humanity, an old man to covetousness, wisdom for his own self, and seeking his own ends; a young man is confident and full of hope, an old man diffident and given to suspect most things; a young man is gentle and obsequious, an old man froward and disdainful; a young man is sincere and open-hearted, an old man cautelous and close; a young man is given to desire great things, an old man to regard things necessary; a young man thinks well of the present times, an old man preferreth times past before them; a young man reverenceth his Superiors, an old man is more forward to tax them: And many other things, which pertain rather to Manners than to the present Inquisition. Notwithstanding old men, as in some things they improve in their Bodies, so also in their Minds, unless they be altogether out of date: namely, that as they are less apt for invention,

tion, so they excell in judgment, and prefer safe things and sound things before specious, also they improve in Garrulity and Ostentation, for they seek the fruit of speech, while they are less able for action: So as it was not absurd that the *Poets* feigned old *Tisbon* to be turned into a *Grasshopper*.



Moveable Canons of the Duration of Life and Form of Death.

Canon I.

Consumption is not caused, unless that which is departed with by one body passeth into another.

The Explication.

There is in Nature no *Annihilating*, or *Reducing to Nothing*: therefore that which is consumed is either resolved into Air, or turned into some Body adjacent. So we see a *Spider*, or *Fly*, or *Ant* in Amber, entombed in a more stately Monument than *Kings* are, to be laid up for Eternity, although they be but tender things, and soon dissipated: But the matter is this, that there is no air by, into which they should be resolved, and the substance of the Amber is so heterogeneous, that it receives nothing of them. The like we conceive would be if a *Stick*, or *Root*, or some such thing were buried in *Quick-silver*: also *Wax*, and *Hony*, and *Gums* have the same Operation, but in part onely.

Canon II.

There is in every Tangible body a Spirit, covered and encompassed with the grosser parts of the body, and from it all Consumption and Dissolution hath the beginning.

The Explication.

NO Body known unto us here in the upper part of the Earth is without a Spirit, either by *Attenuation* and *Concoction* from the heat of the Heavenly Bodies, or by some other way: for the *Concavities* of Tangible things receive not *Vacuum*, but either Air, or the proper Spirit of the thing. And this Spirit whereof we speak is not some *Virtue*, or *Energie*, or *Aeth*, or a *Trifle*, but plainly a Body, rare and invisible, notwithstanding circumscribed by Place, Quantitative, Real. Neither again is that Spirit Air, (no more then Wine is Water) but a body rared, of kin to Air, though much different from it. Now the grosser parts of bodies, (being dull things, and not apt for motion) would last a long time, but the Spirit is that which troubleth, and plucketh, and undermineth them, and converteth the moisture of the body, and whatsoever it is able to digest into new Spirit, and then as well the pre-existing Spirit of the body as that newly made flie away together by degrees. This is best seen by the *Diminution* of the weight in bodies dried through *Perpiration*: for neither all that which is issued forth was Spirit when the body was ponderous, neither was it not Spirit when it issued forth.

Canon III.

The Spirit issuing forth Drieth, Detained and working withen either Melteth, or Putrefieth, or Vivifieth.

The Explication.

There are four Processes of the Spirit, to *Arefaction*, to *Colligation*, to *Putrefaction*, to *Generation* of bodies. *Arefaction* is not the proper work of the Spirit, but of the grosser parts, after the Spirit issued forth, for then they contract themselves partly by their flight of *Vacuum*, partly by the union of the *Homogeneous*, as appears in all things which are aried by age, and in the drier sort of bodies which have passed the fire, as *Bricks*, *Char-coal*, *Bread*. *Colligation* is the mere work of the Spirit: neither is it done but when they are excited by heat; for then the Spirits dilating themselves, yet not getting forth, do insinuate and disperse themselves amongst the grosser parts, and so make them soft and apt to run, as it is in *Metalls* and *Wax*; for *Metalls* and all tenacious things are apt to inhibit the Spirit, that being

excited it issueth not forth. *Putrefaction* is a mixed work of the *Spirits*, and of the grosser parts: for the Spirit (which before restrained and bridled the parts of the thing) being partly issued forth and partly ineebled, all things in the body do dissolve and return to their *Homogenities*, or (if you will) to their Elements; that which was *Spirit* in it is congregated to it self, whereby things putrefied begin to have an ill savour; the *Oily* parts to themselves, whereby things putrefied have that slipperiness and unctuosity; the *Watry* parts also to themselves; the *Dregs* to themselves: whence followeth that *confusion* in bodies putrefied. But *Generation* or *Vivification* is a work also mixed of the Spirit and grosser parts, but in a far different manner: for the Spirit is totally detained, but it swelleth and moveth locally; and the grosser parts are not dissolved, but follow the motion of the spirit, and are, as it were, blown out by it, and extruded into divers figures, from whence cometh that *Generation* and *Organization*: and therefore *Vivification* is always done, in a matter tenacious and clammy, and again, yielding and soft, that there may be both a detention of the spirit, and also a gentle cession of the parts, according as the spirit forms them. And this is seen in the matter as well of all Vegetables as of living Creatures, whether they be engendered of *Putrefaction* or of *Sperm*; for in all these things there is manifestly seen a matter hard to break through, easie to yield.

Canon IV.

IN all living Creatures there are two kinds of Spirits: Liveless Spirits, such as are in bodies Inanimate; and a Vital Spirit superadded.

The Explication.

IT was said before, that to procure long life the Body of man must be considered, first, as *Inanimate*, and not repaired by nourishment; secondly, as *Animate*, and repaired by nourishment: for the former consideration gives Laws touching *Consumption*, the latter touching *Reparation*. Therefore we must know that there are in humane flesh Bones, Membranes, Organs; finally, in all the parts such spirits diffused in the substance of them while they are alive, as there are in the same things (Flesh, Bones, Membranes, and the rest) separated and dead, such as also remain in a *Carkase*: but the *Vital Spirit*, although it ruleth them, and hath some consent with them, yet it is far differing from them, being integral, and subsisting by it self. Now there are two special differences betwixt the *Liveless Spirits* and the *Vital Spirits*. The one, that the *Liveless Spirits* are not continued to themselves, but are, as it were, cut off, and encompassed with a gross body which intercepts them; as *Air* is mix'd with *Snow* or *Froth*: but the *Vital Spirit* is all continued to it self by certain Conduit-pipes through which it passeth, and is not totally intercepted. And this Spirit is two-fold also: the one branched, onely passing through small pipes and, as it were, strings: the other hath a *Cell* also, so as it is not onely continued to it self, but also congregated in an hollow space in reasonable good quantity, according to the Analogy of the body; and in that *Cell* is the fountain of the Rivulets which branch from thence. That *Cell* is chiefly in the Ventricles of the Brain, which in the nobler sort of creatures are but narrow, insomuch that the spirits in them seem scattered over their whole body rather then Celled; as may be seen in *Serpents*, *Eels* and *Fishes*, whereof every of their parts move long after they are cut asunder. *Birds* also leap a good while after their heads are pulled off, because they have little heads and little cells. But the nobler sort of creatures have those Ventricles larger, and Man the largest of all. The other difference betwixt the Spirits is, that the *Vital Spirit* hath a kind of enkindling, and is like a *Wind* or *Breath* compounded of *Flame* and *Air*, as the juices of living creatures have both *Oil* and *Water*. And this enkindling ministereth peculiar motions and faculties: for the smoke which is inflammable, even before the flame conceived, is hot, thin, and movable, and yet it is quite another thing after it is become flame: but the enkindling of the vital spirits is by many degrees gentler then the softest flame, as of *Spirit of Wine*, or otherwise; and besides, it is in great part mixed with an *Aerial* substance, that it should be a *Mystery* or *Miracle*; both of a *Flammable* and *Aireous* nature.

Canon V.

THE Natural Actions are proper to the several Parts, but it is the *Vital Spirit* that excites and sharpeneth them.

The

The Explication.

THe *Actions* or *Functions* which are in the several *Members* follow the nature of the *Members* themselves; (*Attraction*, *Retention*, *Digestion*, *Assimilation*, *Separation*, *Excretion*, *Perspiration*, even *Sense* it self) according to the propriety of the several *Organs*, (the *Stomach*, *Liver*, *Heart*, *Spleen*, *Gall*, *Brain*, *Eye*, *Ear*, and the rest:) yet none of these *Actions* would ever have been actuated but by the vigour and presence of the *Vital spirit* and heat thereof; as one *Iron* would not have drawn another *Iron*, unless it had been excited by the *Load-stone*; nor an *Egg* would ever have brought forth a *Bird*, unless the substance of the *Hen* had been actuated by the treading of the *Cock*.

Canon VI.

The liveless Spirits are next Consubstantial to Air; the vital Spirits approach more to the substance of Flame.

The Explication.

THe Explication of the precedent fourth *Canon* is also a declaration of this present *Canon*: but yet further, from hence it is that all fat and oily things continue long in their Being; for neither doth the *Air* much pluck them, neither do they much desire to joyn themselves with *Air*. As for that conceit it is altogether vain, That *Flame* should be *Air* set on fire, seeing *Flame* and *Air* are no less heterogeneal then *Oil* and *Water*. But whereas it is said in the *Canon*, that the *vital spirits* approach more to the substance of *Flame*; it must be understood, that they doe this more then the *liveless spirits*, not that they are more *Flamy* then *Airy*.

Canon VII.

The Spirit hath two Desires; one of multiplying it self, the other of flying forth and congregating it self with the Connaturals.

The Explication.

THe *Canon* is understood of the *liveless spirits*; for as for the second *Desire*, the *vital spirit* doth most of all abhor flying forth of the body, for it finds no *Connaturals* here below to joyn withall: Perhaps it may sometimes flie to the outward parts of the body, to meet that which it loveth; but the flying forth, as I said, it abhorreth. But in the *liveless spirits* each of these two *Desires* holdeth. For to the former this belongeth, Every spirit feared amongst the grosser parts dwelleth unhappily; and therefore when it finds not a like unto it self, it doth so much the more labour to create and make a like, as being in a great solitude, and endeavour earnestly to multiply it self, and to prey upon the volatile of the grosser parts, that it may be increased in quantity. As for the second *Desire* of flying forth; and betaking it self to the *Air*, it is certain that all light things (which are ever moveable) do willingly go unto their likes near unto them, as a *Drop* of water is carried to a *Drop*, *Flame* to *Flame*: but much more this is done in the flying forth of spirit into the *Air* ambient, because it is not carried to a particle like unto it self, but also as unto the *Globe* of the *Connaturals*. Mean-while this is to be noted, That the going forth and flight of the spirit into air is a redoubled action, partly out of the appetite of the spirit, partly out of the appetite of the air; for the common air is a needy thing, and receiveth all things speedily, as *Spirits*, *Odours*, *Beams*, *Sounds*, and the like.

Canon VIII.

Spirit detained, if it have no possibility of begetting new spirits, intenerateth the grosser parts.

The Explication.

Generation of new Spirit is not accomplished but upon those things which are in some degree near to spirit, such as are humid bodies. And therefore if the grosser parts (amongst which the Spirit converseth) be in a remote degree, although the spirit cannot convert them, yet (as much as it can) it weakeneth, and softneth, and subdueth them, that seeing it cannot increase in quantity, yet it will dwell more at large, and live amongst good neighbours and friends. Now this *Aphorism* is most useful to our End, because it tendeth to the Inteneration of the obstinate parts by the detention of the spirit.

Canon IX.

The Inteneration of the harder parts cometh to good effect, when the Spirit neither flyeth forth, nor begetteth new Spirit.

The History of Life and Death.

The Explication.

THis Canon solveth the knot and difficulty in the Operation of Intenerating by the Detention of the Spirit: for if the Spirit not flying forth wasteth all within, there is nothing gotten to the Inteneration of the parts in their subsistence, but rather they are dissolved and corrupted. Therefore together with the Detention the Spirits ought to be cooled and restrained, that they may not be too active.

Canon X.

THe heat of the Spirit to keep the body fresh and green, ought to be Robust, not Eager.

The Explication.

Also this Canon pertaineth to the solving of the knot aforesaid, but it is of a much larger extent, for it setteth down of what temperament the heat in the body ought to be for the obtaining of Long life. Now this is useful, whether the spirits be detained, or whether they be not. For howsoever the heat of the spirits must be such, as it may rather turn it self upon the hard parts then waste the soft; for the one Desiccateth, the other Intenerateth. Besides, the same thing is available to the well perfecting of Assimilation; for such an heat doth excellently excite the faculty of Assimilation, and withall doth excellently prepare the matter to be Assimilated. Now the properties of this kind of heat ought to be these. First, that it be flow, and heat not suddenly: Secondly, that it be not very intense, but moderate: Thirdly, that it be equal, not incompesed, namely, intending and remitting it self; Fourthly, that if this heat meet any thing to resist it, it be not easily suffocated or languish. This Operation is exceeding subtil, but seeing it is one of the most useful, it is not to be deserted. Now in those Remedies which we propounded to invest the spirits with a Robust heat, or that which we call Operative, not Predatory, we have in some sort satisfied this matter.

Canon XI.

The Condensing of the Spirits in their Substance is available to Long life.

The Explication.

THis Canon is subordinate to the next precedent: for the Spirit condensed receiveth all those four properties of heat whereof we spake; but the ways of Condensing them are set down in the first of the Ten Operations.

Canon XII.

THe Spirit in great quantity hasteneth more to flying forth, and preyeth upon the body more, then in small quantity.

The Explication.

THis Canon is clear of it self, seeing mere Quantity doth regularly increase virtue. And it is to be seen in flames, that the bigger they are, the stronger they break forth, and the more speedily they consume. And therefore over-great plenty or exuberance of the spirits is altogether hurtful to Long life; neither need one with a greater store of spirits then what is sufficient for the function of life, and the office of a good Reparation.

Canon XIII.

THe Spirit equally dispersed maketh less haste to flie forth, and preyeth less upon the body, then unequally placed.

The Explication.

Not onely abundance of spirits in respect of the whole is hurtful to the Duration of things, but also the same abundance unevenly placed is in like manner hurtful; and therefore the more the spirit is shred and inserted by small portions, the less it preyeth; for Dissolution ever beginneth at that part where the spirit is looser. And therefore both Exercise and Frictions conduce much to Long life, for Agitation doth finest diffuse and commix things by small portions.

Canon XIV.

THe inordinate and subultory motion of the Spirits doth more hasten to going forth, and doth prey upon the body more, then the constant and equal.

The Explication.

IN Inanimates this Canon holds for certain; for Inequality is the Mother of Dissolution: but in Animates (because not onely the Consumption is considered, but the Repara-

Reparation, and Reparation proceedeth by the Appetites of things, and Appetite is sharpened by variety: it holdeth, not rigorously, but it is so far forth to be received, that this variety be rather an alteration or interchange than a confusion, and as it were constant in inconstancy.

Canon XV. *The Spirit in a Body of a solid compasure is detained, though unwillingly.*
The Explication.

ALL things do abhor a Solution of their Continuity, but yet in proportion to their Density or Rarity: for the more rare the bodies be, the more do they suffer themselves to be thrust into small and narrow passages; for water will go into a passage which dust will not go into, and air which water will not go into, nay, flame and spirit which air will not go into. Notwithstanding of this thing there are some bounds: for the spirit is not so much transported with the desire of going forth, that it will suffer itself to be too much discontinued, or be driven into over-straight pores and passages, and therefore if the spirit be encompassed with an hard body, or else with an *whitwood* and *tenacious*, (which is not easily divided) it is plainly bound and, as I may say, imprisoned, and layeth down the appetite of going out: wherefore we see that *Metalls* and *Stones* require a long time for their spirit to go forth, unless either the spirit be excited by the fire, or the grosser parts be dislevered with corroding and strong waters. The like reason is there of *tenacious bodies*, such as are *Gums*, save onely that they are melted by a more gentle heat: and therefore the *juices* of the body *hard*, a *close* and *compact skin*, and the like, (which are procured by the *driness* of the *Aliments*, and by *Exercise*, and by the *colours* of the *air*) are good for Long life, because they detain the spirit in close prison that it goeth not forth.

Canon XVI. *In Oily and Fat things the Spirit is detained willingly, though they be not tenacious.*
The Explication.

THe spirit, if it be not irritated by the *antipathy* of the body enclosing it, nor fed by the over-much *likeness* of that body, nor solicited nor invited by the *external body*, it makes no great stir to get out: all which are wanting to *Oily bodies*, for they are neither so pressing upon the spirits as *hard bodies*, nor so near as *warry bodies*, neither have they any good agreement with the *air ambient*.

Canon XVII.

THe speedy flying forth of the *Warry humor* conserves the *Oily* the longer in his being.

The Explication.

VVE said before that the *Warry humors*, as being consubstantial to the *Air*, flee forth soonest, the *Oily* later, as having small agreement with the *Air*. Now whereas these two humors are in most bodies, it comes to pass that the *Warry* doth in a sort betray the *Oily*, for that issuing forth insensibly carrieth this together with it. Therefore there is nothing more furthereth the conservation of bodies then a gentle drying of them, which causeth the *Warry humor* to expire, and inviteth not the *Oily*; for then the *Oily* enjoyeth the proper nature. And this tendeth not onely to the inhibiting of *Putrefaction*, (though that also followeth) but to the conservation of *Greenness*. Hence it is, that gentle *Frications* and *moderate Exercises*, causing rather *Perpiration* then *Sweating*, conduce much to Long life.

Canon XVIII. *Air excluded conserveth to Long life, if other Inconveniences be avoided.*
The Explication.

VVE said a little before, that the flying forth of the spirit is a redoubled action, from the appetite of the spirit and of the air, and therefore if either of these be taken out of the way, there is not a little gained. Notwithstanding divers *Inconveniences* follow hereupon, which how they may be prevented we have shewed in the second of our *Operations*.

Canon XIX.

Youthful Spirits inserted into an old Body might soon turn Nature's course back again.

The Explication.

THe nature of the *Spirits* is as the uppermost wheel, which turneth about the other wheels in the body of man, and therefore in the *Intention* of Long life, that ought to be first placed. Hereunto may be added, that there is an easier and more expedite way to alter the *Spirits*, then to other *Operations*. For the *Operation* upon the *Spirits* is two-fold: the one by *Aliments*, which is slow, and, as it were, about, the other, (and that two-fold) which is sudden, and goeth directly to the *Spirits*, namely, by *Vapours*, or by the *Affections*.

Canon XX.

Juices of the Body hard and roscid are good for Long life.

The Explication.

THe reason is plain, seeing we shewed before, that hard things, and oily or roscid are hardly dissipated: notwithstanding there is difference, (as we also noted in the tenth *Operation*) That juice somewhat hard is indeed less dissippable, but then it is withall less reparable: therefore a *Convenience* is interlaced with an *Inconvenience*, and for this cause no wonderful matter will be achieved by this. But roscid juice will admit both *Operations*; therefore this would be principally endeavoured.

Canon XXI.

Whatsoever is of thin parts to penetrate, and yet hath no Acrimony to bite, begetteth Roscid Juices.

The Explication.

THis Canon is more hard to practise then to understand. For it is manifest, whatsoever penetrateth well, but yet with a sting or tooth, (as do all sharp and four things) it leaveth behind it wheresoever it goeth some mark or print of *driness* and *cleaving*, so that it hardneth the *juices*, and chappeth the *parts*: contrarily, whatsoever things penetrate through their *thinness* merely, as it were by stealth, and by way of insinuation, without violence, they bedew and water in their passage. Of which sort we have recounted many in the fourth and seventh *Operations*.

Canon XXII.

Assimilation is best done when all Local Motion is expended.

The Explication.

THis Canon we have sufficiently explained in our Discourse upon the eighth *Operation*.

Canon XXIII.

Alimentation from without, at least some other way then by the Stomach, is most profitable for Long life, if it can be done.

The Explication.

VVE see that all things which are done by *Nutrition* ask a long time, but those which are done by embracing of the like (as it is in *Infusions*) require no long time. And therefore *Alimentation* from without would be of principal use, and so much the more, because the *Faculties* of *Concoction* decay in old age: so that if there could be some auxiliary *Nutritions*, by *Bathings*, *Unctions*, or else by *Clysters*, these things in conjunction might doe much, which single are less available.

Canon XXIV.

Where the *Concoction* is weak to thrust forth the Aliment, there the Outward parts should be strengthened to call forth the Aliment.

The Explication.

That which is propounded in this Canon is not the same thing with the former; for it is one thing for the outward Aliment to be attracted inward, another for the inward Aliment to be attracted outward: yet herein they concur, that they both help the weakness of the inward *Concoctions*, though by divers ways.

Canon XXV.

ALL sudden Renovation of the Body is wrought either by the Spirit, or by Malacissations.

The Explication.

THere are two things in the body, *Spirits* and *Parts*: to both these the way by *Nutrition* is long and about; but it is a short way to the *Spirits* by *Vapours* and by the *Affections*, and to the *Parts* by *Malacissations*. But this is diligently to be noted, that by no means we confound *Alimentation* from without with *Malacissation*; for the intention of *Malacissation* is not to nourish the parts, but onely to make them more fit to be nourished.

Canon XXVI.

Malaciffation is wrought by *Consubstantial*s, by *Imprinters*, and by *Closers* up.

The Explication.

THe reason is manifest; for that *Consubstantial*s do properly supple the body, *Imprinters* do carry in, *Closers* up do retain and bridle the *Perpiration*, which is a motion opposite to *Malaciffation*. And therefore (as we described in the ninth *Operation*) *Malaciffation* cannot well be done at once, but in a course or order. First, by excluding the *Liquor* by *Thickners*; for an outward and gross Infusion doth not well compact the body; that which entrencheth must be subtil, and a kind of vapour. Secondly, by *Intenerating* by the consent of *Consubstantial*s; for bodies upon the touch of those things which have good agreement with them, open themselves, and relax their pores. Thirdly, *Imprinters* are *Convoys*, and insinuate into the parts the *Consubstantial*s; and the mixture of gentle *Astringents* doth somewhat restrain the *Perpiration*. But then, in the fourth place, follows that great *Astriction* and *Closure* up of the body by *Emplaistration*, and then afterward by *Inunction*, until the *Supple* be turned into *Solid*, as we said in the proper place.

Canon XXVII.

Frequent Renovation of the Parts Repairable watereth and reneweth the less Repairable also.

The Explication.

WE said in the Preface to this History, that the *Way of Death* was this, That the *Parts Repairable* died in the fellowship of the *Parts less Repairable*; so that in the *Reparation* of these same *less Repairable Parts* all our forces would be employed. And therefore being admonished by *Aristotle's* observation touching *Plants*, namely, That the putting forth of new shoots and branches refresheth the body of the Tree in the passage; we conceive the like reason might be, if the *flesh* and *blood* in the body of man were often renewed, that thereby the *bones*, themselves, and *membranes*, and other parts which in their own nature are *less Repairable*, partly by the chearful passage of the *juices*, partly by that new cloathing of the young *flesh* and *blood*, might be watered and renewed.

Canon XXVIII.

Refrigeration or Cooling of the body, which passeth some other ways then by the Stomach, is useful for Long life.

The Explication.

THe reason is at hand: for seeing a *Refrigeration* not temperate, but powerful, (especially of the *blood*) is above all things necessary to Long life; this can by no means be effected from within as much as is requisite, without the destruction of the *Stomach* and *Bowels*.

Canon XXIX.

That Intermixing or Intangling, that as well Consumption as Reparation are the works of Heat, is the greatest obstacle to Long life.

The Explication.

Almost all great works are destroyed by the *Natures* of things Intermixed, when as that which helpeth in one respect hurteth in another; therefore men must proceed herein by a sound judgment, and a discreet practice. For our part, we have done so as far as the matter will bear, and our memory serveth us, by separating *benign* heats from *hurtful*; and the *Remedies* which tend to both.

Canon XXX.

Curing of Diseases is effected by Temporary Medicines; but Lengthning of Life requireth Observation of Diets.

The Explication.

Those things which come by accident, as soon as the causes are removed cease again; but the continued course of nature, like a running River, requires a continual rowing and sailing against the stream; therefore we must work regularly by Diets. Now Diets are of two kinds: *Set Diets*, which are to be observed at certain times; and *Familiar Diet*, which is to be admitted into our daily repast. But the *Set Diets* are the more potent, that is, a course of *Medicines* for a time: for those things which are of so great virtue that they are able to turn Nature back again; are, for the most part, more strong, and more speedily altering, then those which may without danger be received into a continual use. Now in the *Remedies* set down in our *Intentions* you shall

shall find onely three *Set Diets*, the *Opiate Diet*, the *Diet Malacissant* or *Suppling*, and the *Diet Emaciant* and *Renewing*. But amongst those which we prescribed for *Familiar Diet*, and to be used daily, the most efficacious are these that follow, which also come not far short of the virtue of *Set Diets*: *Nitre* and the *subordinates* to *Nitre*, the *Regiment* of the *Affections* and *Course* of our *Life*, *Refrigerators* which pass not by the *Stomach*; *Drinks* *Roscidating*, or *ingendring Oily Juices*; besprinkling of the *bloud* with some *finer Matter*, as *Pearls*, certain *Woods*, competent *Unctions* to keep out the *Air*, and to keep in the *Spirit*; *Heaters* from without, during the *Assimilation* after *sleep*; avoiding of those things which inflame the *Spirit*, and put it into an *eager heat*, as *Wine* and *Spices*; lastly, a moderate and seasonable use of those things which endue the *Spirits* with a *robust Heat*, as *Saffron*, *Cresses*, *Garlick*, *Elecampane*, and *compound Opiders*.

Canon XXXI.

The Living Spirit is instantly extinguished if it be deprived either of Motion, or of Refrigeration, or of Aliment.

The Explication.

NAmely, these are those three which before we called the *Porches of Death*, and they are the proper and immediate passions of the *Spirit*. For all the *Organs* of the principal parts serve hereunto, that these three *Offices* be performed; and again, all destruction of the *Organs* which is deadly brings the matter to this point, that one or more of these three fail. Therefore all other things are the divers ways to *Death*, but they end in these three. Now the whole *Fabrick* of the *Parts* is the *Organ* of the *Spirit*, as the *Spirit* is the *Organ* of the *Reasonable Soul*, which is *Incorporeal* and *Divine*.

Canon XXXII.

Flame is a Momentary Substance, Air a Fixed; the Living Spirit in Creatures is of a middle Nature.

The Explication.

THis matter stands in need both of an higher Indagation and of a longer Explication then is pertinent to the present Inquisition. Mean while we must know this, that *Flame* is almost every moment generated and extinguished; so that it is continued onely by succession: but *Air* is a fixed body, and is not dissolved; for though *Air* begets new *Air* out of watery moisture, yet notwithstanding the old *Air* still remains; whence cometh that Super-operation of the *Air* whereof we have spoken in the Title *De Venia*. But *Spirit* is participant of both Natures, both of *Flame* and *Air*, even as the nourishments thereof are, as well *Oil*, which is homogeneous to *Flame*, as *Water*, which is homogeneous to *Air*: for the *Spirit* is not nourished either of *Oily* alone, or of *Watery* alone, but of both together; and though *Air* doth not agree well with *Flame*, nor *Oil* with *Water*, yet in a mix'd body they agree well enough. Also the *Spirit* hath from the *Air* his easie and delicate impressions and yieldings, and from the *Flame* his noble and potent motions and activities. In like manner the *Duration* of *Spirit* is a mixed thing, being neither so momentary as that of *Flame*, nor so fixed as that of *Air*: And so much the rather it followeth not the condition of *Flame*, for that *Flame* itself is extinguished by accident, namely, by Contraries and Enemies enviroing it; but *Spirit* is not subject to the like conditions and necessities. Now the *Spirit* is repaired from the lively and florid bloud of the small *Arteries* which are inserted into the *Brain*; but this *Reparation* is done by a peculiar manner, of which we speak not now.

Canon XXXIII.

Living of Diseases is effected by temporary Medicines, and by the Operation of Diet.

The Explication.

THe things which come by accident, as soon as the causes are removed, are removed again; but the continued course of nature, like a running River, requires a continual flowing and falling against the stream, which we call the *operation of Diet*. Now Diet is of two kinds, one *Food*, which is to be continued into our daily repair, but the *Drinks* are the most potent; that is a course of Medicines for a time: for those things which are of great virtue that they are able to turn Nature back again, are for the most part more strong, and more speedily acting, then those which may without danger be continued into a continual use. Now in the Remedies for those in our former

